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This is EPA Region 10's first annual summary report of environmental indicators for air, water, and land media. The Region's programs in air, water, toxics, pesticides, and hazardous waste are attempting to characterize their progress in addressing environmental pollution via the measures described in this report.

Each program's chapter includes (1) a statement describing (or choosing) the indicator(s); (2) a narrative explaining how the indicator does a good job of describing environmental quality or progress and how it falls short; (3) graphs/tables/maps to display data; and (4) plans for modification of present indicators and/or development of future ones.

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Region 10 Environmental Indicators FY '87 Summary

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FOREWORD

I am pleased to present the FY 87 annual summary of environmental indicators. This report is an essential step in a long term endeavor to track environmental data and represents a solid commitment to manage for environmental results.

Clearly these indicators do not describe the whole picture. Within this summary, it is common for program managers to caution that the indicators listed are incomplete or do not adequately describe their program's progress. Like all measurements, they describe only one (hopefully meaningful) facet of an issue. However, they are important tools, providing managers with insight for creating strategies to address current and emerging environmental problems.

Over the past year, water, air, hazardous waste, pesticides and toxics program staff worked to produce this report. Much of this has been done as additional work to their programmatic duties. I would like to thank the authors for their extra efforts. I would also like to acknowledge Dick Bauer, Deputy Regional Administrator, for his informed, consistent and enthusiastic support for this initiative, and the Policy, Planning and Evaluation Branch for their unstinting committment to the completion of this project.

Robie G. Russell
Regional Administrator

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Development of Environmental Indicators in Region 10

Background

EPA HQ and the regions have struggled with the development of environmental indicators for more than a decade. The agency has done a good job of developing and tracking surrogate measures, e.g., number of enforcement actions taken, permits written, and construction grant dollars obligated, but we have yet to answer the very basic and essential question: ***"Is the environment getting cleaner?"***

Region 10 began its struggle to answer this question in 1976 with publication of our first Environmental Profile which attempted to show trends primarily in air and water quality. Work continued on and off, and in 1983 we published a more comprehensive assessment of environmental problems with our Environmental Management Report. In 1985 the EMR update included the results of regional brainstorm sessions to suggest environmental indicators. Participants of these sessions grappled with questions such as, *"If a given program is perfectly executed, what results would we expect to see in the real world?"* Boosted by these preliminary efforts, the process began in earnest in February, 1986 when development of environmental indicators became a regional priority.

During FY 86 each program was provided a summary of past and current efforts within the Region, EPA HQ, and other regions to develop environmental indicators for that program. This was followed by small group meetings with program managers and staff. As a result, each program either chose ambient or surrogate environmental indicators or proposed a strategy to develop indicators.

In FY 87, the development process continued. The next steps for each program—whether to implement chosen indicators or to further the search and selection process—were outlined and incorporated into the Regional Accountability System (RAS). Each program committed to producing a first annual summary of their results by the end of FY 87.

Current Status

The environmental indicator summaries through FY 87 are presented in this report. Each program presented the content of their summary in individual briefings for the DRA during November and December, 1987. A thorough discussion of all measures resulted in approval of proposed indicators, further refinement of measures, and/or commitments to prepare specific additional environmental indicators. Decisions resulting from the briefings were put into writing and signed by both the programs and the DRA. The results are summarized at the end of each chapter on the pages entitled "**Environmental Indicators, FY 88 and Beyond**".

Next Steps and New Directions

Throughout FY 88 programs will track and summarize their chosen environmental indicators and pursue the agreed upon improvements and additions. At the end of FY 88, each program will prepare a second annual summary of results. We expect this will be an ongoing process for the forseeable future.

While raw data, tables and graphs are useful for displaying change over time, pictures can often be worth many numbers. As a new dimension, the DRA has encouraged programs to develop and maintain photographic records of environmental problems and improvements to document changes over time. This may be particularly useful, for example, to show progress at Superfund sites, to document changes in water quality and biota in problem water bodies, or to portray wetland losses or gains over time.

Lessons Learned

The following tools and lessons learned are offered for the benefit of others attempting to develop environmental indicators:

1. **A strong coordinating office**: The Region 10 Policy, Planning and Evaluation Branch, Management Division, working on behalf of the RA/DRA, provided guidance, encouragement, incentives and tangible support to program offices. This ranged from brainstorming sessions to hiring and supervising college students to crunch numbers and help analyze data.

2. **Ownership of the measures**: Program managers and staff were guided and assisted throughout the process, but the ultimate selection of environmental indicators was theirs.

3. **Start small**: This can be an overwhelming project unless participants are encouraged to tackle it one step at a time. Expectations were ambitious but realistic. We felt it was more important that we come up with useful measures rather than perfect measures.

4. **Accountability for results**: Accountability measures for each program were included in the Regional Accountability System (RAS), Senior Staff performance agreements, and discussed in quarterly reviews with division directors and branch chiefs.

5. **Top management support**: The DRA in Region 10 has made environmental indicators one of his top priorities. His strong, consistent and informed support for this project has been critical to its success.

Approach

The framework used for developing environmental indicators is shown in Figure 1. We employed the concept that EPA and state programmatic activity affect polluter behaviour; that polluter behavior in turn affects ambient pollution levels in the environment; and that ambient levels of pollution have an effect upon health and ecological integrity. Thus, we have encouraged programs to develop measures on more than one level (see Figure 2), realizing that the easiest to produce but most limited in scope are the activity measures; the most desireable but often most difficult to acquire are those reflecting environmental quality.

Table 1 displays each program's FY 87 environmental indicators according to the hierarchy of preferred data; Table 2 lists those for FY 88 and beyond. Though "true" environmental indicators are the ideal measures, all levels of indicators, though surrogate in nature, are considered valuable, if not essential, to overall program management.

Figure 1
Developing Environmental Indicators
Managing for Environmental Results
Conceptual Framework

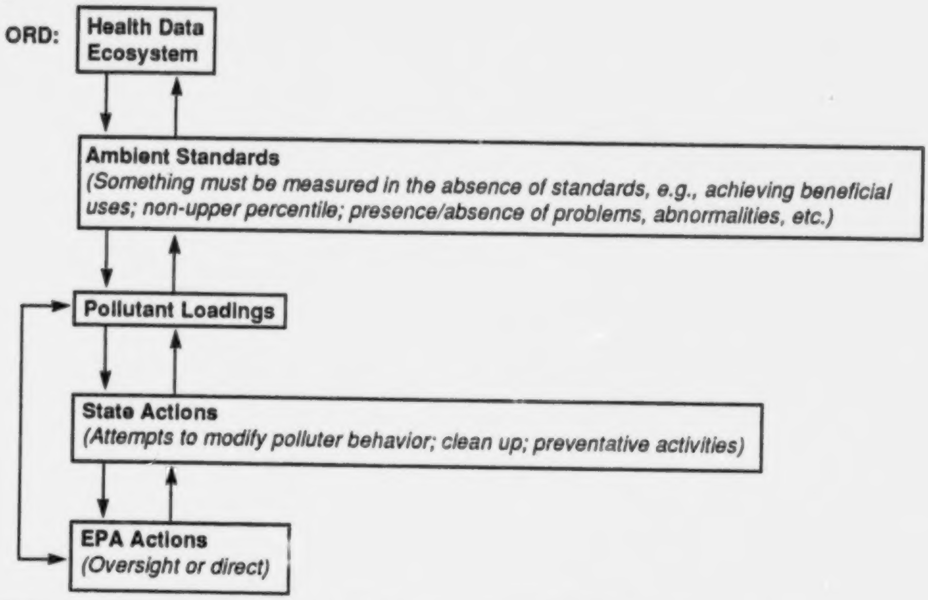

ORD:
Health Data
Ecosystem
Ambient Standards
(Something must be measured in the absence of standards, e.g., achieving beneficial uses; non-upper percentile; presence/absence of problems, abnormalities, etc.)
Pollutant Loadings
State Actions
(Attempts to modify polluter behavior; clean up; preventative activities)
EPA Actions
(Oversight or direct)

Figure 2
Levels of Environmental Data

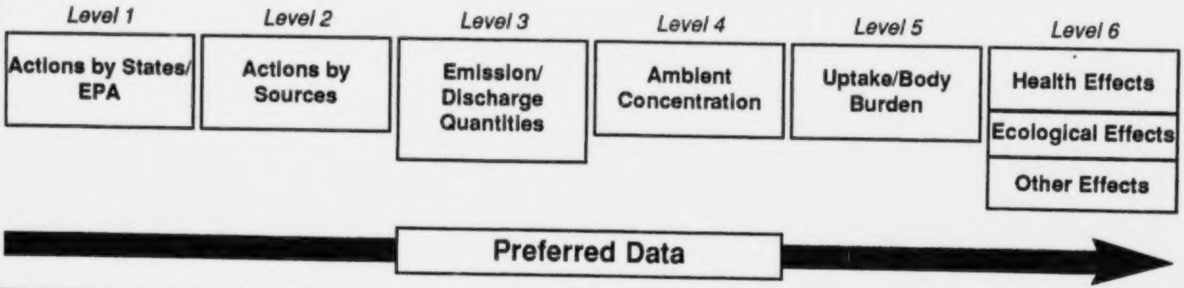

Level 1
Actions by States/ EPA
Level 2
Actions by Sources
Level 3
Emission/ Discharge Quantities
Level 4
Ambient Concentration
Level 5
Uptake/Body Burden
Level 6
Health Effects
Ecological Effects
Other Effects
Preferred Data

Table 1

Environmental Indicators In Region 10

FY 87

Program	Level 1 *Actions by States/EPA*	Level 2 *Actions by Sources*	Level 3 *Emission/ Discharge*	Level 4 *Ambient Concentrations/ Quantities*	Level 5 *Uptake/ Body Burden*	Level 6 *Health Effects; Ecological Effects; Other Effects*
Water Division:						
Surface Water	NPDES: -# permits w/ biomonitoring -# WQ-based permits (vs. BAT permits) -# WQ-based permits w/ toxics limits	-Pollutant loadings to WQL segments	NPDES: -Total loading limits for toxics	-Track for problem water bodies: -Listing of waterbody status -Listing of WQL segments -Limiting parameters for WQL segments -Permits allowing discharges to WQL segments -WQL segments for which all WQ-based controls have been implemented -Aerial lakeshore analysis for N. ID lakes -Status of classified shell-fish areas -Water Quality Index		-PNW Rivers Study database -Basin Pilot Projects Yakima River Basin: - # smolts produced - Temperature - Nutrient levels - Riparian vegetation - Toxics concentratns Tualatin River Basin: - DO levels - Nutrients/ chlorophyll a Chehalis River Basin/ Grays Harbor: - % ocean catch - Na-ATPase levels in smolting salmon - Coho smolt productn - Coho escapement -Summary of waters fully, partially, or not supporting uses
Puget Sound				Chemical contamination, bacterial contamination, and habitat loss and degradation as described by the following: -Available w/ final Monitoring Plan -Everett Harbor, Elliott Bay, Lake Union Ship Canal studies -Puget Sound Atlas: maps & narrative -Monitoring Plan Inclusions: Water Quality; Sediment Quality; Biological Conditions; River Monitoring; Habitat Types; Ancillary Data -Puget Sd. characterization reports (existing historical data) on (1) WQ Water Column Trends since the 1930's; and (2) Toxics or problems in non-urban bays since the 1890's	-Available w/ final Monitoring Plan -Toxics & bacteria in shellfish & edible macroalgae Monitoring Plan Inclusions: Biological Conditions	-Available w/ final Monitoring Plan -Risk Assessment report on seafood consumption

Table 1 (continued)

Environmental Indicators in Region 10
FY 87

Program	Level 1 *Actions by States/EPA*	Level 2 *Actions by Sources*	Level 3 *Emission/ Discharge*	Level 4 *Ambient Concentrations/ Quantities*	Level 5 *Uptake/ Body Burden*	Level 6 *Health Effects; Ecological Effects; Other Effects*
Water Division:						
Construction Grants			-BOD & SS improvements @ completed projects initiating operation in FY88			
Drinking Water	-# of enforcement actions by states & EPA to address SNCs -Types actions taken to gain compliance -# & % SNCs addressed by each type action	-# & % surface systems using filtration or equivalent -% PWS in compliance w/ M/R for bacti & turbidity -# PWS in SNC w/ bacti & turbidity MCLs & M/R			-# & % population served by systems in SNC & in compliance	
Wetlands	-Acreage of impacted wetland that is mitigated for -Staff time spent on major vs. minor wetland projects -% projects w/ substantive comments -# signif. envmtl. issues raised & # resolved -# enforcemt action & # resolved -# permits denied due to EPA comments		-Cu. yds. dredged material allowed in-water & upland in Columbia R. & Puget Sound	-Acres wetlands lost -Acres wetlands impacted -Acres wetlands protected by project modification, w/drawal or permit denial -Linear ft shoreline impacted by state		
Ground Water	-Developing and activating a Region 10 GW data system for Environmental Indicators database					
Air & Toxics Division:						
Air	-CO: Status of non-attainment area control strategies -State & local activities to control air toxics -Asbestos: # of inspections	-Asbestos: # of notifications for removal/renovation -Asbestos: # of notifications of NESHAPs violations -Enforcement: # of significant violators & return to compliance	-O_3: VOC emissions (ozone precursors)	-CO & O_3: # attainment vs. non-attainment areas -Ambient concentrations for criteria pollutants -PM_{10} ambient concentratns		
	—Working to develop environmental indicators for Air Toxics, Radon, and Asbestos—					

Table 1 (continued)

Environmental Indicators in Region 10
FY 87

Program	Level 1 *Actions by States/EPA*	Level 2 *Actions by Sources*	Level 3 *Emission/ Discharge*	Level 4 *Ambient Concentrations/ Quantities*	Level 5 *Uptake/ Body Burden*	Level 6 *Health Effects; Ecological Effects; Other Effects*
Toxics		-Compliance rates for PCB inspections -Equipment (transformers, capacitors, other) removed from service early due to settlemt negotiatns -Asbestos compliance rates for EPA inspections -Amount of asbestos in schools abated due to settlement agreements			-PCB residues in biota	
Pesticides	Data search & evaluation in progress. Will report on feasibility of using data for indicators in the following areas:			-Pesticides in DW data -Specific pesticides in the envmnt		-Pesticides illness incidents: human, wildlife
Hazardous Waste Division:						
RCRA				-GW Quality: Detection & remedy of haz. constituent releases at RCRA facilities —both regulated & non-regulated units		
Superfund	-Preliminary Assessmts completed -Site investigations completed -Emergency removal actions -Orders issued for emergency removals -RI/FS initiated -RD/RA initiated/ completed -Orders issued for RI/FS,RD/RA -$ cost recovered -Alternative technologies used	-Estimated $ value for PRP action (emergency removal) -Estimated $ value for PRP action (RI/FS, RD/RA)		-Aquifers made useable or other envmtl improvements due to Superfund action (optional)		

Table 2

Environmental Indicators in Region 10

FY 88 & Beyond

Program	Level 1 *Actions by States/EPA*	Level 2 *Actions by Sources*	Level 3 *Emission/ Discharge*	Level 4 *Ambient Concentrations/ Quantities*	Level 5 *Uptake/ Body Burden*	Level 6 *Health Effects; Ecological Effects; Other Effects*
Water Division:						
Surface Water	NPDES: -# & % permit w/ biomonitoring -# WQ-based permits (vs. BAT permits) -# WQ-based permits w/ toxics limits	-Pollutant loadings to WQL segments: pt and non-point	NPDES: -Total loading limits for toxics	-Track for problem water bodies: -Listing of waterbody status -Listing of WQL segments -Limiting parameters for WQL segments -Permits allowing discharges to WQL segments -WQL segments for which all WQ-based controls have been implemented -Aerial lakeshore analysis for N. ID lakes -Status of classified shellfish areas -Water Quality Index		-PNW Rivers Study database -**Basin Pilot Projects** Yakima River Basin: - # smolts produced - Temperature - Nutrient levels - Riparian vegetation - Toxics concentratns Tualatin River Basin: - DO levels - Nutrients/ chlorophyll a Chehalis River Basin/ Grays Harbor: - % ocean catch - Na-ATPase levels in smolting salmon - Coho smolt productn - Coho escapement -Summary of waters fully, partially, or not supporting uses -Maps showing WQ trends
Puget Sound			-NPDES contaminant loading	-Sediment Chemistry -Dissolved oxygen -Turbidity -Nutrients -Chlorophyll -Pathogen Indicators -Wetland habitat quality & quantity -Wetland mitigation success	-Sediment Bioassays -Chemicals in fish tissue -Chemicals in shellfish tissue -Bacteria in shellfish	-Benthic community analyses -Fish Abundance -Fish disease -Shellfish abundance -Effluent & near-source biomonitoring
Construction Grants			-BOD & SS improvements @ completed projects initiating operation in FY88, w/ possible enhancements of 1) more historic data; 2) O&M results; 3) decreases in residual chlorine; 4) toxics removed 5) before & after monitoring cases			

Table 2 (continued)

Environmental Indicators in Region 10

FY 88 & Beyond

Program	Level 1 *Actions by States/EPA*	Level 2 *Actions by Sources*	Level 3 *Emission/ Discharge*	Level 4 *Ambient Concentrations/ Quantities*	Level 5 *Uptake/ Body Burden*	Level 6 *Health Effects; Ecological Effects; Other Effects*
Water Division:						
Drinking Water	-# & % SNCs for which "return to compliance" action has been taken -# state & EPA enforcemt actions -% SNC addressed by enforcemt action	-# PWS in SNC -% PWS in compliance w/ bacti & turbidity M/R & MCLs -# & % community systems w/ surface water sources which use filtration or equivalent -# & % of non-community systems w/ surface water sources which use filtration or equivalent			-# persons served by systems in SNC & % of total population served by PWS -# persons served by systems in full compliance & % of total population served by PWS	
Wetlands	-Acreage of impacted wetland that is mitigated for -Staff time spent on major vs. minor wetland projects -% projects w/ substantive comments -# signif. envmtl. issues raised & # resolved -# enforcemt action & # resolved -# permits denied due to EPA comments		-Cu. yds. dredged material allowed in-water & upland in Columbia R. & Puget Sound	-Acres wetlands lost -Acres wetlands impacted -Acres wetlands protected by project modification, w/drawal or permit denial -Linear ft shoreline impacted by state		
Ground Water	-Measure of GW cleanup in UST program to be developed -# & % of state registered pesticides which are considered leachers by EPA	-UST: # & % of corrosion-protected tanks in use	-Quantity of leachable pesticides in use in vulnerable GW areas	-% DW & monitoring wells w/ nitrates above a level of concern -# & % PWS in violation of MCLs -# & % of HW sites w/ GW contamination above a health advisory or MCL & moving off site	-Population at risk from PWS in violation of MCLs -Population at risk from HW contaminants approaching & in DW wells	

Table 2 (continued)

Environmental Indicators in Region 10

FY 88 & Beyond

Program	Level 1 *Actions by States/EPA*	Level 2 *Actions by Sources*	Level 3 *Emission/ Discharge*	Level 4 *Ambient Concentrations/ Quantities*	Level 5 *Uptake/ Body Burden*	Level 6 *Health Effects; Ecological Effects; Other Effects*
Air & Toxics Division:						
Air	-Air Toxics: Review state evaluation & control of point sources -Asbestos: track notifications, inspections & NOVs -SIPs: track rulemakings/SIP approvals by pollutant -Radiation: track public education & results	-Track significant violators	-Criteria Pollutants: emission inventory data -Air Toxics: Track annual changes to baseline inventories for selected pollutants	-Criteria pollutants: ambient concentrations -Try to link enforcemt action i.e., reduced emissions, w/ ambient concentrations -Radiation: compare baseline levels w/ future measuremts -Radiation: explore use of ERAMS		
Toxics	-AHERA Indicators (to be developed) -Asbestos-in-School Summary Report, i.e., compliance levels over time, % school districts & students covered, % in compliance w/ settlement agrmts, asbestos abatement by school settling complaints, etc.	-Compliance rates for PCB inspections -Equipment (transformers, capacitors, other) removed from service early due to settlemt negotiatns -Amount of asbestos in schools abated due to settlement agrmts			-PCB residues in biota	
Pesticides		-Public Complaint Data (state logs—not health agency)		-Pesticides in DW data (EPA's National DW Well Survey)	-Pesticides in biota (EPA's National Bioaccumulation Study)	

Table 2 (continued)

Environmental Indicators in Region 10
FY 88 & Beyond

Program	Level 1 *Actions by States/EPA*	Level 2 *Actions by Sources*	Level 3 *Emission/ Discharge*	Level 4 *Ambient Concentrations/ Quantities*	Level 5 *Uptake/ Body Burden*	Level 6 *Health Effects; Ecological Effects; Other Effects*
Hazardous Waste Division:						
RCRA				-GW quality at RCRA regulated LDFs -GW quality/Soils quality at RCRA regulated TSFs other than LDFs (incineration, storage & treatmt facilities		
Superfund	-Preliminary Assessmts completed -Site investigations completed -Emergency removal actions -Orders issued for emergency removals -RI/FS initiated -RD/RA initiated/ completed -Orders issued for RI/FS,RD/RA -$ cost recovered -Alternative technologies used	-Estimated $ value for PRP action (emergency removal) -Estimated $ value for PRP action (RI/FS, RD/RA)		-GW cleanup (NPL sites) -Soils cleanup (NPL & non-NPL removal sites) -Surface materials cleanup (NPL & non-NPL removal sites)		

Organization of the Report

This document is a compilation of reports presented by the program offices in Region 10 under the direction of the Deputy Regional Administrator and the Policy, Planning and Evaluation Branch. Each program was given maximum flexibility to describe their work in developing environmental indicators. However, each summary includes certain basic components:

1. A statement describing (or choosing) the indicator(s);
2. A narrative explaining how the indicator does a good job of describing environmental quality or progress and how it falls short;
3. Graphs/tables/maps to display data; and
4. Plans for modification of present indicators and/or development of future ones. Each program is responsible for reporting on the measures which they have selected with the assistance, in many cases, of the Environmental Services Division.

The programs' reports are organized according to air, water and land media, realizing that there are obvious cross-media concerns for all programs. Programs' measures were not necessarily developed in isolation of other programs. For example, the Office of Ground Water worked actively with hazardous waste, drinking water, pesticides, and Environmental Services Division staff to formulate their environmental indicators.

For conformity, the FY 87 environmental indicators (which are the measures discussed in the summary reports) are listed at the beginning of each chapter. Following each report is a list of the modified indicators to be used for FY 88 and beyond.

Chapter 1: Surface Waters

During FY 87, the Office of Water Planning agreed to review all possible data sources revealed through a surface water monitoring survey conducted earlier (as well as those subsequently discovered) for the purpose of selecting the best possible set of environmental indicators.

The following paper describes the process and rationale by which surface water indicators have been selected, presents the selections, and describes modifications for FY 88 and beyond.

Surface Water Environmental Indicators
FY 87 Selections

A. **General**

1. **Summary of Waters Fully, Partially, or not Supporting Uses**
2. **Waterbody Tracking System**
   - a. *Listing of waterbody status*
   - b. *Listing of water quality-limited segments*
   - c. *Limiting parameters for WQL segments*
   - d. *List of all permits allowing discharges to WQL segments*
   - e. *Listing of WQL segments for which all water quality-based controls have been implemented*
3. **NPDES Permits**
   - a. *Number/percentage of permits with biomonitoring requirements*
   - b. *Number of water quality-based permits issued*
   - c. *Number of water quality-based permits with toxics limits*
   - d. *Total loading limits for toxics*
4. **Aerial Lakeshore Analysis for North Idaho Lakes**
5. **Status of Classified Shellfish Areas**
6. **Water Quality Index**
7. **Pacific Northwest Rivers Study Database**
   (Includes Information on Resident Fish, Wildlife, and Recreational Resources, and Natural and Cultural Features)

B. **Basin Pilot Projects**

1. **Yakima River Basin**
   - a. *Number of salmonid smolts produced*
   - b. *Temperature*
   - c. *Nutrient levels*
   - d. *Riparian vegetation inventory*
   - e. *Toxics concentrations*
2. **Tualatin River Basin**
   - a. *Dissolved oxygen levels*
   - b. *Nutrients/chlorophyll a*
3. **Chehalis River Basin/Grays Harbor**
   - a. *Percent catch in ocean fishery*
   - b. *Na-ATPase levels in smolting salmon*
   - c. *Coho salmon smolt production*
   - d. *Coho salmon escapement*

Chapter 1: Surface Waters

Introduction

There is a recognized need to establish better indicators of the "health" of environmental systems. Such indicators are important in assessing the current status and trends of pollution in surface waters, in evaluating the effectiveness of environmental programs in controlling pollution, and in determining priorities and directions for future water quality management efforts.

Current tracking of regulatory actions and environmental issues by the Environmental Protection Agency (EPA) and state water quality agencies is primarily based upon a "program" orientation. As a consequence, current measures tend to reflect whether, or the degree to which, programs are being implemented (e.g., SPMS measures). Environmental indicators should, however, be based upon an "environmental problem" orientation, and should be useful in identifying actual or potential problems and subsequently tracking whether problems are increasing or decreasing in severity. This "problem" tracking should also indicate whether environmental control programs are effective in addressing problems, and the relative merit of various programs. All programs involved in addressing a particular problem should be concerned with this tracking as a measure of progress towards achieving water quality goals.

The program orientation which EPA and the states currently have has prevented the development of an effective institutional mechanism for focusing on problem oriented environmental indicators. We have therefore used a two-fold approach to develop an array of indicators which both evaluate water quality on a Region-wide basis, while at the same time tracking specific environmental problems of concern.

Role of the Office of Water Planning (OWP)

We believe that the role of the OWP is to help direct and guide the states' efforts to protect and maintain the physical, chemical, and biological integrity of surface waters. Implicit in this role is helping to develop processes to identify the magnitude and scope of environmental problems, set management priorities, and track progress in resolving problems. Our role is not necessarily to perform these functions for the state, but to ensure that they are accomplished. Environmental indicators should play a key role in accomplishing these functions. Thus our role is to ensure that appropriate environmental indicators are used by the states to carry out these processes.

Section 305(b) of the Clean Water Act requires that states produce biannual reports (referred to as 305(b) reports) to assess the quality of each state's surface waters. We believe that the 305(b) reports represent the appropriate (and congressionally mandated) vehicle for compiling information on environmental indicators. Unfortunately, past 305(b) reports have not been useful in assessing progress in improving water quality or defining future directions for management programs. This is because 1) the reports have focused on general measures which do not provide specific information on problem sources or waterbodies, and 2) states have developed widely differing approaches to compiling information and classifying waters based on their current status. It is clear that the 305(b) reports will need to be modified extensively to provide adequate information to assess and guide water quality management programs. To achieve this, the OWP is focusing on revising state input into the 305(b) reports. In addition, the OWP will continue to develop new approaches to tracking the progress of environmental management programs. These approaches will be tested on a pilot basis to provide examples to states of their feasibility and usefulness, and, where appropriate, to encourage state or other federal agencies to focus their monitoring programs on more meaningful measures. As new indicators are developed, specific tasks may need to be identified in the State-EPA Agreements (SEAs) requiring states to compile and evaluate the information. The information would subsequently appear in the next 305(b) report.

The Water Quality Act (WQA) of 1987 defined a number of new directions for states which involve extensive application of environmental indicators. Several of these new directions affected the OWP and our effort to develop environmental indicators during the last year. Of particular concern are the many assessments (e.g., for waterbodies, toxics problems, lakes status, and nonpoint sources) which states are required to complete. Each of these assessments is a major undertaking. The OWP had been pushing the states to complete scaled-down versions of these assessments before passage of the WQA. The results of these scaled-down assessments were to have played a significant role in our effort to develop indicators. The WQA, however, will require significantly more comprehensive assessments, and set specific time frames for their completion in FY89. This in effect extended many of the deadlines which we had set. We did not have the resources or the support money to push the states ahead of the Congressional time frames. As a result, the "indicators" used to assess toxics and NPS problems, the status of lakes, and for tracking waterbodies may be significantly modified as states complete these statutory requirements during FY89.

Major Accomplishments to Date

To meet the goal of developing a set of environmental indicators which better reflect the health of environmental systems, the OWP has accomplished a number of activities during the past year, as discussed below. We recognize that the development of new approaches to problem assessment and the emergence of new environmental problems necessitate the continued development and refinement of environmental indicators. Therefore, we have also initiated a number of actions which will hopefully improve the quality and value of environmental indicators, as well as their application in the decision-making process.

Significant actions to date include:

- A baseline set of environmental indicators has been developed which addresses both the overall status of water quality in the Region and specific water quality problems in localized geographic areas. Specific, problem-oriented indicators were developed for three pilot areas (the Yakima, Tualatin, and Chehalis River basins).

- Where available, information is presented on the status of each indicator. This information provides a baseline of existing conditions. Future updates and comparison with the baseline conditions will allow EPA and other regulatory/resource agencies to evaluate the effectiveness of their pollution control programs.

- A new position has been created in OWP; this will allow reassignment of duties to address the establishment, in consultation with responsible land/resource managers, of the following for selected waterbodies:
    - realistic management/regulatory goals
    - major factors limiting achievement of those goals
    - major actions needed to achieve goals
    - means by which progress to achieving goals will be measured (It is the means by which progress in attaining goals will be measured that will constitute the environmental indicators for the selected waterbodies.)

- There has been great difficulty in the past in defining environmental indicators which reflect the pollutants, particularly sediments, generated from NPS activities. Since sediment is the major pollutant generated in the Region, accounting for approximately 70 percent of all pollution, this has been a major concern. In order to address this concern, the OWP has completed the following steps:
    - Negotiation of a $50,000 contract with HQ to identify viable environmental indicators for measuring the success of NPS control programs in the Pacific Northwest. The measures identified will be critical in tracking activities conducted under Section 319 of the Water Quality Act, and will provide the basis for reporting to Congress on the effectiveness of NPS programs in 1991.
    - Development of an initiative to establish monitoring plans for each national forest to provide data on actual impacts of timber harvesting on the "fishery production potential" of representative streams. The lack of proper monitoring in the past made it very difficult (if not impossible) for the forests to ensure that fishery resources will be protected to the level mandated by the CWA.

- Funding for a near coastal waters pilot project was obtained from HQ to help define the information needed to properly manage the newly established near coastal waters initiatives. This includes measures to define how programs' environmental impact will be measured.

- A guidance document to assist States in producing the 1988 305(b) report will be completed during fall of 1987. This document will define many of the indicators which the state will be expected to include in the report. The report will then hopefully provide much of the information to be used in future Environmental Management Reports.
    - Two major efforts were undertaken which involved the use of environmental indicators to identify, prioritize, and track resolution of significant environmental/regulatory problems, as follows:

Grays Harbor:

An environmental indicator showing reduced survival of smolting coho salmon from the Chehalis River and inner Grays Harbor was used to identify a major problem within the Region. The indicator generated the information necessary to 1) garner $100,000 in funding and in-kind support to study the cause of the problem in 1987; 2) obtain $400,000 from the Washington legislature to support future study of the problem by the Washington Department of Fisheries (WDF); and 3) encourage regulatory agencies to set a high priority on performing water quality studies in the Chehalis River and Grays Harbor in support of the WDF studies (the total resources committed by regulatory agencies could be in excess of $300,000).

The indicator, as discussed later in this report, will be used to track future progress towards alleviating the cause of the reduced survival.

Idaho Antidegradation:

The state of Idaho developed a proposed procedure to use a stream data base to implement water quality standards in the state. The data base, which we have proposed as an environmental indicator, was created through funding by the Bonneville Power Administration (under the mandate of the Northwest Power Planning Act). Tracking of the data base in the future will allow evaluation of the effectiveness of the water quality standards (specifically the antidegradation policy) in protecting the aquatic life and recreational resources in Idaho's surface waters.

Existing Indicators

Indicators of surface water quality currently incorporated into state 305(b) reports focus on the number of stream or coastline miles and the number of acres/square miles of lakes or estuaries fully supporting, partially supporting, or not supporting designated beneficial uses. Also recorded are the total miles or areas surveyed or inventoried as part of state-wide monitoring efforts. Most states also list the percentage of waters affected by major types of activities.

Two shortcomings of this approach have already been mentioned (the lack of site- or problem-specific information and the varying criteria by which states classify waters). Before discussing new indicators which address these shortcomings, it is important to fully understand why the existing indicators are inadequate.

Lack of Specificity:

The mechanisms in the CWA which force the identification and management/regulation of pollution sources are directed at problem- or site-specific approaches. Simple listings of the percentage of waters partially or not supporting uses does not indicate the major types of pollution problems states are facing, the magnitude or frequency of criteria exceedances (and thus the level of use impairment), or geographic areas where a number of activities threatening or impairing uses are concentrated. While some states have supplied lists of "problem" waterbodies, they have failed to indicate which waterbodies are truly water quality limited, which waterbodies could meet water quality standards with implementation of BAT/BCT and cost effective and reasonable best management practices, and which waterbodies are of concern because of potential threats to uses. There has also been no effort to track progress in resolving actual or potential problems in these waterbodies over time. The result has been that many states still identify as major environmental concerns the same problems identified 10 years ago, with little apparent progress towards resolution. The reports have thus failed to be useful in evaluating environmental programs through time or in providing an effective basis for prioritizing management efforts.

Criteria for Classification:

States have developed vastly different criteria for classifying waters as fully, partially, or not supporting beneficial uses. EPA HQ has tried to be more specific in providing guidance on how waters should be classed; however, problems still remain. For example, the HQ guidance states that waters are to be listed as fully supporting uses if greater than 90 percent of measurements for a particular parameter comply with water quality criteria. Based upon this guidance, monthly D.O. sampling may show that a water body complies with a state's D.O. criteria 11 of 12 samplings, and therefore fully supports a use. However, if every August the D.O. drops to 2.0 mg/L, significant impairment of the beneficial use could result. Unfortunately, a state could still classify that waterbody as fully supporting a use. Although this is an extreme example, it illustrates the type of classification problem which can occur.

Another major problem with the existing reporting requirements is that criteria for classification are based upon water quality criteria, which focus almost entirely on water column measures. Yet the CWA provides a mandate to protect the physical, chemical, and biological integrity of the nation's waters. This would necessarily include considerations of the habitat quality needed to support beneficial uses. There are numerous examples of situations where criteria applying to the water column were apparently not exceeded, but extensive damage to beneficial uses resulted from habitat degradation. This has occurred in streams adjacent to road construction and timber harvesting operations, where sedimentation has degraded both spawning and rearing habitat for salmon and trout. This has also occurred where toxic contaminants have built-up in the sediments of Puget Sound, even though there were few or no exceedances of water quality criteria in the water column. These examples suggest the need for a more holistic approach to regulating pollution in surface waters, as well as in documenting the status of pollution through the use of environmental indicators.

Proposed Indicators

The new environmental indicators being proposed are intended to address the concerns discussed above. We are also proposing to continue using the existing indicators. The combination of new and old indicators will hopefully offer the following advantages:

1) Provide general measures which reflect the overall status of surface water quality in Region 10.

2) Identify specific waterbodies or watersheds experiencing water quality problems. This would include identification of water quality limited segments, and the parameters of concern in each segment.

3) Identify the major types of pollution problems in each state and the Region as a whole.

4) Provide a more holistic approach to the protection of beneficial uses by considering essential habitat components.

5) Provide indicators which more closely relate to particular types of pollution, thus providing more specific tools for tracking the results of pollution control efforts.

6) Include measures which reflect the success of society's overall efforts to control pollution effects, rather than focusing only on controls developed under the authority of the CWA.

7) Provide information on the existing and emerging pollution sources of greatest environmental and human health concern as a means of guiding future water quality management direction.

The proposed indicators are:

1. ***Waters Fully, Partially, or Not Supporting Uses***

This indicator will continue to be compiled as part of the 305(b) reports. While the limitations of this indicator have been discussed at length, it still provides a general overview on the status of water quality within the Region. In addition, this is one of the few indicators which EPA HQ consistently compiles on a national basis. The indicator will be improved by providing a more consistent basis for classifying water, and by requiring a more detailed breakdown of the pollution sources preventing attainment of beneficial uses. The most recent information compiled is presented in Table 1. Future updates will be provided by states in their 305(b) reports. A major emphasis in future management actions will be to increase the amount of waters assessed. The management goal for this indicator is to have all waters listed as fully supporting the designated uses.

2. ***Waterbody Tracking System***

The water quality data used to report to Congress on the status of the nation's water is typically disorganized, inconsistent in format, and widely dispersed. This seemingly reasonable and easy requirement has become, therefore, extremely difficult to satisfy.

In response to the apparent disorganization in water quality data, EPA has developed a computerized Waterbody Tracking System (WTS). This system is being actively promoted as a means of organizing and cataloging water quality information for waterbodies nationwide. The software should be finalized in November 1987, and pilot studies for several states, including Washington, are underway. In 1988, all states will be required to present assessment data for the 305(b) reports in a format that is compatible with the WTS, and in subsequent years, states will be required to input assessment data directly into the system.

Table 1. Summary of waters supporting, partially supporting, or not supporting designated uses in Region 10. Data are arranged by state and and waterbody type.

REGION: 10

WATERBODY TYPE[1]: Rivers

	STATE				REGIONAL TOTAL	DATA SOURCE[2]
	AK	ID	OR	WA		
DESIGNATED USE SUPPORT:						
Total area	365,000	15,720	90,000	40,492	511,212	A, B
Area assessed	5,025	7,310	27,715	UNK	40,050	
Supporting	2,662	6,046	9,665	UNK	18,373	
Part. supptg.	1,447	572	1,915	UNK	3,934	
Not supptg.	916	692	275	UNK	1,883	
Unknown			15,860		15,860	

[1] Waterbody type: Rivers (miles); Lakes (acres); Estuaries (sq. miles); Coastal Waters (miles); Great Lakes (shore miles).

[2] Data source: A - 1986 State 305(b) report; B - ASIWPCA NPS Assessment; C - Other

Table 1. (cont.)

REGION: 10

WATERBODY TYPE: Rivers

	STATE				REGIONAL TOTAL	DATA SOURCE
	AK	ID	OR	WA		
NONPOINT SOURCE IMPACTS:						
Assessed for NPS	1,614	7,070	22,500	3,920	35,104	B
Area with use impairments due to:						
Agriculture	13	2,097	9,289	600	11,999	
Res. extract.	1,221	380	33	40	1,674	
Urban runoff	88	0	93	100	281	
Hydromod.	25	UNK	31	UNK	56	
Land disposal	89	208	0	130	427	
Construction	178	576	0	UNK	754	
Silviculture	UNK	UNK	4,808	30	4,838	
Other	UNK	757	50	1,060	1,867	
TOTAL area w/use imp. due to NPS	1,614	4,018	14,304	1,960	21,896	

Table 1. (cont.)

REGION: 10

WATERBODY TYPE[1]: Lakes

	STATE				REGIONAL TOTAL	DATA SOURCE[2]
	AK	OR	ID	WA		
DESIGNATED USE SUPPORT:						
Total area	12,787,200	500,000	508,180	613,582	14,408,962	A,B
Area assessed	27,513	192,000	362,718	UNK ↓	582,231	
Supporting	17,278	112,700	362,624		492,602	
Part. supptg.	10,235	75,200	94		85,529	
Not supptg.	0	4,100	0		4,100	
Unknown						

[1] Waterbody type: Rivers (miles); Lakes (acres); Estuaries (sq. miles); Coastal Waters (miles); Great Lakes (shore miles).

[2] Data source: A - 1986 State 305(b) report; B - ASIWPCA NPS Assessment; C - Other

Table 1. (cont.)

REGION: 10

WATERBODY TYPE: Lakes

	STATE				REGIONAL TOTAL	DATA SOURCE
	AK	ID	OR	WA		
NONPOINT SOURCE IMPACTS:						
Assessed for NPS	15,352	465,449	191,798	613,582	1,286,181	B
Area with use impairments due to:						
Agriculture	UNK	46,737	34,918	125,070	206,725	
Res. extract.	5,600	0	0	UNK	5,600	
Urban runoff	1,302	0	3,682	143,720	148,704	
Hydromod.	UNK	UNK	1,286	0	1,286	
Land disposal	3,550	130,000	210	6,860	140,620	
Construction	4,900	21,093	0	UNK	25,993	
Silviculture	UNK	UNK	0	16,780	16,780	
Other	UNK	0	38,904	270	39,174	
TOTAL area w/use imp. due to NPS	15,352	197,830	79,000	292,700	584,882	

Table 1. (cont.)

REGION: 10

WATERBODY TYPE[1]: Estuaries

	STATE			REGIONAL TOTAL	DATA SOURCE[2]
	AK	OR	WA		
DESIGNATED USE SUPPORT:					
Total area	UNK	71	2,669	2,740	
Area assessed	126	66.5	UNK	192.5	A, B
Supporting	98	3.8	UNK	101.8	
Part. supptg.	26	62.7	UNK	88.7	
Not supptg.	2	0	UNK	2	
Unknown					

[1] Waterbody type: Rivers (miles); Lakes (acres); Estuaries (sq. miles); Coastal Waters (miles); Great Lakes (shore miles).

[2] Data source: A - 1986 State 305(b) report; B - ASIWPCA NPS Assessment; C - Other

Table 1. (cont.)

REGION: 10

WATERBODY TYPE: Estuaries

	STATE			REGIONAL TOTAL	DATA SOURCE
	AK	OR	WA		
NONPOINT SOURCE IMPACTS:					
Assessed for NPS	UNK	66	2,669	2,735	B
Area with use impairments due to:	UNK				
Agriculture	UNK	22	UNK	22	
Res. extract.	UNK	0	UNK	0	
Urban runoff	UNK	0	UNK	0	
Hydromod.	UNK	0	UNK	0	
Land disposal	UNK	18	UNK	18	
Construction	UNK	0	UNK	0	
Silviculture	UNK	0	UNK	0	
Other	UNK	5	UNK	5	
TOTAL area w/use imp. due to NPS	UNK	45	148	193	

Table 1. (cont.)

REGION: 10

WATERBODY TYPE[1]: Coastal Waters

	STATE			REGIONAL TOTAL	DATA SOURCE[2]
	AK	OR	WA		
DESIGNATED USE SUPPORT:					
Total area	33,9400	362	994	[3] 25,296	B
Area assessed	UNK	UNK	UNK	UNK	
Supporting	↓	↓	↓	↓	
Part. supptg.	↓	↓	↓	↓	
Not supptg.	↓	↓	↓	↓	
Unknown	↓	↓	↓	↓	

[1] Waterbody type: Rivers (miles); Lakes (acres); Estuaries (sq. miles); Coastal Waters (miles); Great Lakes (shore miles).

[2] Data source: A - 1986 State 305(b) report; B - ASIWPCA NPS Assessment; C - Other

Table 1. (cont.)

REGION: 10

WATERBODY TYPE: Coastal Waters

	STATE			REGIONAL TOTAL	DATA SOURCE
	AK	OR	WA		
NONPOINT SOURCE IMPACTS:					
Assessed for NPS	UNK	0	994	994	B
Area with use impairments due to:	↓				
Agriculture	↓	UNK	0	0	
Res. extract.	↓	↓	↓	↓	
Urban runoff	↓	↓	↓	↓	
Hydromod.	↓	↓	↓	↓	
Land disposal	↓	↓	↓	↓	
Construction	↓	↓	↓	↓	
Silviculture	↓	↓	↓	↓	
Other	↓	↓	↓	↓	
TOTAL area w/use imp. due to NPS	↓	↓	0	0	

The WTS is expected to fill the niche of preparing status reports on the nation's waters. It will not, however, provide a means of tracking progress or trends in water quality. Because of this weakness, the WTS will likely become "dust covered" except during 305(b) report preparation.

The OWP will be modifying the WTS so that it can become a more viable tool. We propose to add two memo fields to the software. The first memo field will contain background information on each waterbody, such as its location, water quality problems, land use history, and any other pertinent information. This can be used to (re-)familiarize a person with the waterbody and also to prepare briefing material when necessary. The second field will contain waterbody tracking information such as progress made implementing management actions. This could be updated periodically and would serve a dual purpose of providing basic tracking information and illustrating overall waterbody-specific environmental progress.

OWP will guide the states in implementing the WTS. We will also work with Washington and Oregon to identify four to five waterbodies on which to conduct pilot tracking initiatives. For these waters, we will require quarterly progress to be entered into the WTS by either the OPS offices or by the states. We will then use this information to prepare quarterly progress reports for distribution to interested parties.

Eventually, this effort will be expanded to cover a greater number of waters, such as those that are water quality-limited (WQL), within all four states (Table 2). Section 303 of the CWA requires that water quality-based controls, or total maximum daily loads (TMDLs)/waste load allocations (WLAs), be implemented on all WQL segments. The number of WQL segments in our Region on which water quality-based controls have been implemented is not tracked and is unknown.

WQL segments are those waters not meeting water quality standards following implementation of best available technology. For such segments, water quality-based permits, versus technology-based permits, must be written using careful analysis, and, in some instances, sophisticated modeling.

Table 2

Water quality-limited segments in Region 10 as of 11-16-87.

*Abbreviations are as follows: **BOD**=biological oxygen demand, **AMM**=ammonia, **SS**=suspended solids, **NIT**=nitrogen, **PHOS**=phosphorus, **TEMP**=temperature, **FCOL**=fecal coliform bacteria, **TURB**=turbidity, **CHL A**=chlorophyll a, **NUT**=nutrients, **MET**=metals, **PRI POLL**=priority pollutants, **DO**=dissolved oxygen, and **CHL**=chlorine.*

Regional Water Quality Limited Segments

Waterbody	Segment Number	Water Quality Limited Parameters
Idaho		
Boise River (lower)	SWB-270	BOD, AMM
Clearwater River	CB-20	BOD, Toxics
Payette River, N.F.	SWB-324	BOD, SS
Pend Oreille River	PB-30P	BOD, AMM
Portneuf River	USB-420	NIT, PHOS
Snake River	SWB-30	BOD, AMM, TEMP
Snake River	USB-60	BOD, AMM, TEMP
Spokane River	PB-40S	PHOS
Spokane River	PB-50S	PHOS
Oregon		
Bear Creek		DO, pH, FCOL, TURB
Calapooia River		DO, TURB
Coquille River		DO, TURB
Garrison Lake (Acres)		CHL A
Grande Ronde River		pH, FCOL
Klamath River		DO, CHL A, pH, AMM
Pudding River		DO, TURB
South Umpqua River		DO, pH, FCOL, AMM
Tualatin River		DO, CHL A
Umatilla River		pH
Yamhill River		FCOL, TURB

Waterbody	Segment Number	Water Quality Limited Parameters
Washington		
Budd Inlet	06-13-03	NUT
Chehalis River	10-23-13	BOD
Columbia River	26-00-01	FCOL, NUT, MET, PRI POLL
Columbia River	26-00-04	MET
Hoko River	09-19-09	TURB
Inner Grays Harbor	10-22-04	BOD, Toxics
Okanogan River	22-49-02	Toxics?
Palouse River *Excepting South Fk.*	16-34-01	FCOL, pH, NUT, TURB
S.F. Palouse River	16-34-02	FCOL, NUT, TURB, AMM
S.F. Stillaguamish River	03-05-05	FCOL, TURB (Natural)
Salmon Creek & Tribs	13-28-03	NUT, TEMP (Natural)
Ship Canal & Lake Union	04-08-01	FCOL, PRI POLL
Spokane River & Tribs	NUT	24-57-04
Spokane River (Lower)	24-54-01	NUT
Weaver Ck.	13-28-03	FCOL, DO, NUT
White River & Tribs	05-10-05	FCOL, TURB (Natural)
Wildcat Ck.	10-22-10	NUT
Yakima R. & Tribs	18-37-01	AMM, CHL
Yakima R. & Tribs	18-37-02	FCOL, NUT

Interest in controls on WQL segments has been growing nationwide. In response, Headquarters has begun requiring each region to submit, on a quarterly basis, the number of both water quality-based permits issued and WQL segments for which all controls have been implemented.

The state is responsible for fulfilling Section 303 requirements. Therefore, WQL tracking should be compiled at the state level and transmitted by the region to Headquarters. OWP will therefore require states to provide the following:

a) For each WQL segment, determine the following information:
- The parameters for which the segment is limited;
- All permits whose discharges include WQL parameters;
- Permit expiration dates;
- Whether or not the permits contain water quality-based controls;
- Date water quality-based controls were implemented in permit;
- Allowable loading under permits.

b) Submit, on a quarterly basis, a list of any segments for which all water quality-based controls have been implemented.

The desired management goal, following identification of WQL segments, will be to implement all required water quality-based controls for each segment.

3. NPDES Permits

While not providing a direct measure of ambient conditions, a set of "indicators" has been developed which will allow tracking of those permit requirements reflecting efforts to control adverse effects to water quality. The items to be tracked are:

a. **Number of major permits with biomonitoring requirements.**
(See Table 3.)

b. **Number of water quality-based permits issued.**
(See Table 4.)

c. **Number of water quality-based permits with toxics limits.**
(See Table 4.)

d. **Total loading limits for toxics.**
(See Table 5.)

As water quality concerns are more closely considered in permit development, the number of permits containing biomonitoring requirements or water quality-based limits will be expected to increase. A compilation of total loading limits will help address concerns that even though the concentrations of toxic pollutants in effluent discharges have generally decreased significantly, production increases resulting from facility expansions and new sources have resulted in increases in total loadings.

Weaknesses with these "indicators" are that they do not address whether all dischargers needing water quality-based controls are known, and what percentage of needed water quality-based controls have been implemented. They also do not indicate whether the controls incorporated into the permits are adequate to fully protect water quality. Use of the WTS should help address these concerns.

Currently, there is no vehicle for readily obtaining the NPDES permitting information which we wish to track. While some of the information compiled for this report was available on the Permit Compliance System (PCS), the vast majority of information had to be dug out of permit/compliance files or the memories of permit writers. This proved to be an inefficient and time-consuming process. Therefore, a draft checklist was developed which will hopefully be completed for each major permit issued in Region 10 by regional personnel writing or reviewing the permits (see Appendix 1). The information will then be entered into either PCS or an OWP data base tracking system. This will allow ready access to summary information on these indicators, some of which are also tracked as SPMS commitments.

Biomonitoring:
The number of permits issued in Region 10 which currently contain biomonitoring requirements are listed in Table 3. This data is current as of June, 1987. A reasonable management goal for this indicator would be to require biomonitoring by each major discharger. Facilities consistently showing no toxicity could be allowed to eliminate or reduce the frequency of biomonitoring, depending upon their individual circumstances.

It would be of value to know the results of the biomonitoring tests conducted by permittees as a measure of the effectiveness of current controls. Unfortunately, this information was not available without investing an inordinate amount of resources to obtain it. This "indicator" will be evaluated further in the future for possible use by the OWP. We will also attempt to track the percentage of permits containing biomonitoring requirements in the future.

Table 3
Number of permits in Region 10 containing biomonitoring requirements as of June, 1987.

	State				
	Alaska	Idaho	Oregon	Washington	Total
No. Permits	3	4	16	37	60

Water Quality-Limited Permits:
Tracking implementation of water quality-based controls should be a particularly useful environmental indicator. When used in association with the WTS, it will indicate when all point sources are controlled on segments with serious water quality problems. It will alert managers that management activities on such segments should shift to monitoring and, as necessary, to nonpoint source controls.

OWP has begun tracking issuance of water quality-based permits on WQL segments (Table 4). The Region has not yet, however, determined how many or what type of permits exist for each WQL segment. We approach each permit as it comes up for renewal on an individual basis. We therefore do not know when all water quality-based permits for all (or any) of our WQL segments have been written.

Implementing water quality-based controls is a state responsibility, and, if the states default, a regional responsibility. Unless the states begin to track such implementation, or EPA completes the work in their stead, we will have no way of knowing when our mutual responsibilities under Section 303 have been fulfilled. The OWP will include this task in the SEA or 305(b) regional guidance to the states.

Total Pollutant Loading Limits:

Information on the total loading limits for toxics was difficult to obtain. This information generally had to be calculated by hand after pulling out both the new (issued in FY87) and old permits. Calculations were made only for major permits with limits for toxic pollutants (we included both ammonia and chlorine, since these "conventional pollutants" can also cause toxicity) in both the old and new permits. Loading limits as such did not always exist, and were often computed from flow and concentration limits. As can be seen from Table 5, total loadings often increased despite a general trend towards lower allowable concentrations. A statutory goal of zero discharge is mandated in the CWA; an interim management goal might be a reduction in the total loading of toxic pollutants. It should be noted, however, that this indicator reflects allowable loading under permit limits, and not the actual loading by each facility.

Table 4

Water quality-based permits issued in Region 10 during FY87.

(No permits were issued in FY87 which were water quality-limited specifically for toxic pollutants.)

State	Permittee	Issue Date	Receiving Water	Parameters
Washington	Prosser	5/13/87	Yakima River	NH_4,Chlorine
Idaho	Ore-Ida Foods	3/31/87	Snake (Payette) River	BOD,NH_4,Temp.
	JR Simplot Co.	3/31/87	Snake (Burley) River	BOD,NH_4,Temp.
	West Boise	3/01/87	Boise River	BOD,NH_4
	Lander	3/01/87	Boise River	BOD,NH_4

Table 5

Total pollutant loading limits for toxics (including chlorine and ammonia), in selected Region 10 permits.

Limits are expressed as kg/year.

Facility	Parameter	Old Limits	New Limits
Boise, Lander Street	NH_4	279,127	248,565
	Chlorine	1,402*	823
Boise, West	NH_4	235,201	166,133
JR Simplot	NH_4**	137,224	159,675
City of Everett	Chromium	1,387	2,584
	Copper	1,387	775
	Zinc	1,387	10,852
Chevron Fert. (Columbia River)	N_H4	108,077	108,077
	Oil and Grease	350,400	350,400
Ore-Ida Foods, Inc.	NH4**	119,455	139,042
City of Kitsap	Chlorine	1,682	1,682
City of Prosser	NH4	19,802	137,204
METRO, Renton	NH4	854,337	1,856,559
	Cadmium	399	502
	Chromium	5,762	12,043
	Copper	5,161	4,014
	Lead	2,638	5,018
	Mercury	721	301
	Nickel	4,949	4,014
	Zinc	7,765	5,018
	Oil and Grease	756,864	1,505,318

* *Limit was 8,410 kg/yr before 9/84*

** *Loading rates for old and new permits were the same; 1987 permit limits reflect a longer discharge season.*

4. Aerial Lakeshore Analysis for North Idaho Lakes

Our Region has received $65,000 from HQ to fund a survey of North Idaho lakes (Pend Oreille, Hauser, Priest, Hayden, Twin, Cocollala, and Spirit Lakes) using aerial remote sensing by multi-spectral photoanalysis and interpretation. This technique is very useful in pin-pointing failing septic systems, point and nonpoint source discharges, and potential point and nonpoint toxic sources from shorelines of lakes. The project will be completed by December 31, 1987.

We believe significant benefits related to environmental indicators will result from this effort:

- EPA and Idaho will gain valuable insight into an area of mutual environmental concern; nutrient enrichment of North Idaho lakes from septic leachate and land use practices.

- A cost-effective means for rapid assessment of point and nonpoint source impacts to lakes will be evaluated.

- This technology could become readily available in the Northwest if, during this study, it is demonstrated to be effective for Northwest environments.

- The photographic data collected can be used in educational seminars to point out problems to homeowner groups, for targeting further data collection for enforcement effects, and as a record of current conditions for purposes of future comparisons.

- Field work can be spent working with known and suspected sources of pollution. In the case of a vast system like Lake Pend Oreille this can be a great time saving service.

5. Status of Classified Shellfish Area:

The direct measurement of the quality of marine/estuarine waters is a complex and expensive task. Shellfish such as oysters, clams, and mussels can concentrate disease causing bacteria and viruses as well as certain toxic pollutants , radionuclides, and biotoxins (e.g., paralytic shellfish poison, known commonly as PSP). Consequently, shellfish can be used as practical long-term indicators of water quality and the effectiveness of pollution control efforts.

The criteria used to classify shellfish growing waters were established by state health agencies and the shellfish industry in consultation with the U.S. Food and Drug Administration under the national Shellfish Sanitation Program. Waters that are free from fecal contamination , industrial wastes, radioactive elements, and biotoxins are classified as "approved for commercial shellfish harvesting." "Conditionally approved" waters may be closed when seasonal increases in population, freshwater runoff containing contaminants at certain times of the year, or temporary malfunctioning of wastewater treatment plants result in failure to meet the criteria. Waters found to be contaminated or suspected of being contaminated, which would produce shellfish unsafe for human consumption, are classified as "closed."

The trend data contained in Figure 1 (on the following page) suggests that environmental programs aimed at protecting commercial shellfish beds have had limited success. This is particularly true in Washington State, where fewer acres were approved for shellfish harvest in 1985 than in 1970, 1974, and 1980. This does not indicate that individual control programs directed at specific shellfish areas have not been successful. However, any individual successes have apparently been offset by the appearance of new problems in other areas. Any new closures occurring during recent years may simply be due to the stresses caused by a growing population, and the recent spread of PSP.

Most of the closures in Washington and Oregon are due to bacterial contamination, whereas most closures in Alaska result from naturally high levels of paralytic shellfish poison. Many of the bacterial sources in Washington and Oregon result from NPS activities. As EPA and state water quality agencies focus more strongly in the future on NPS controls, it is expected that the number of acres (or percentage) of shellfish beds classed as approved would increase. It may also be valuable in the future to track the production of shellfish per acre for approved or conditionally approved areas to determine if productivity decreases, increases, or remains constant.

Table 6 (on the following page) provides a more detailed description of the status of shellfish production areas by state for 1985. The National Shellfish Register, which was the source of this information, is currently being updated. The update will be completed in 1989.

6. Water Quality Index (WQI)

The WQI developed by Region 10, and incorporated into the March 1983 Environmental Management Report, should continue to be used as a measure for determining river segment status. The value of using this index is that it integrates information on a number of different parameters reflecting the overall condition of the segment.

There are three major drawbacks to using this index. First, the time and resources needed to compute the index make it impractical to calculate for all water segments. Therefore, it will be necessary to use the index only on "indicator" segments. This is not a major concern, as long as the index is calculated for segments of exceptional ecological value , segments which have recognized pollution problems (e.g., water quality-limited segments), and segments which are representative of those not in either category above.

The second drawback is that the index primarily focuses on water quality criteria, which tend to reflect water column measures. The index thus does not consider habitat condition (for example, the suitability of a stream reach for salmonid spawning or rearing). This drawback could be overcome by using the WQI in association with a habitat condition index. While no generally accepted habitat condition index exists, the OWP will continue to explore this possibility through contact with fishery resource agencies.

The third drawback is that the general public has no intuitive understanding of the WQI. This creates difficulty in

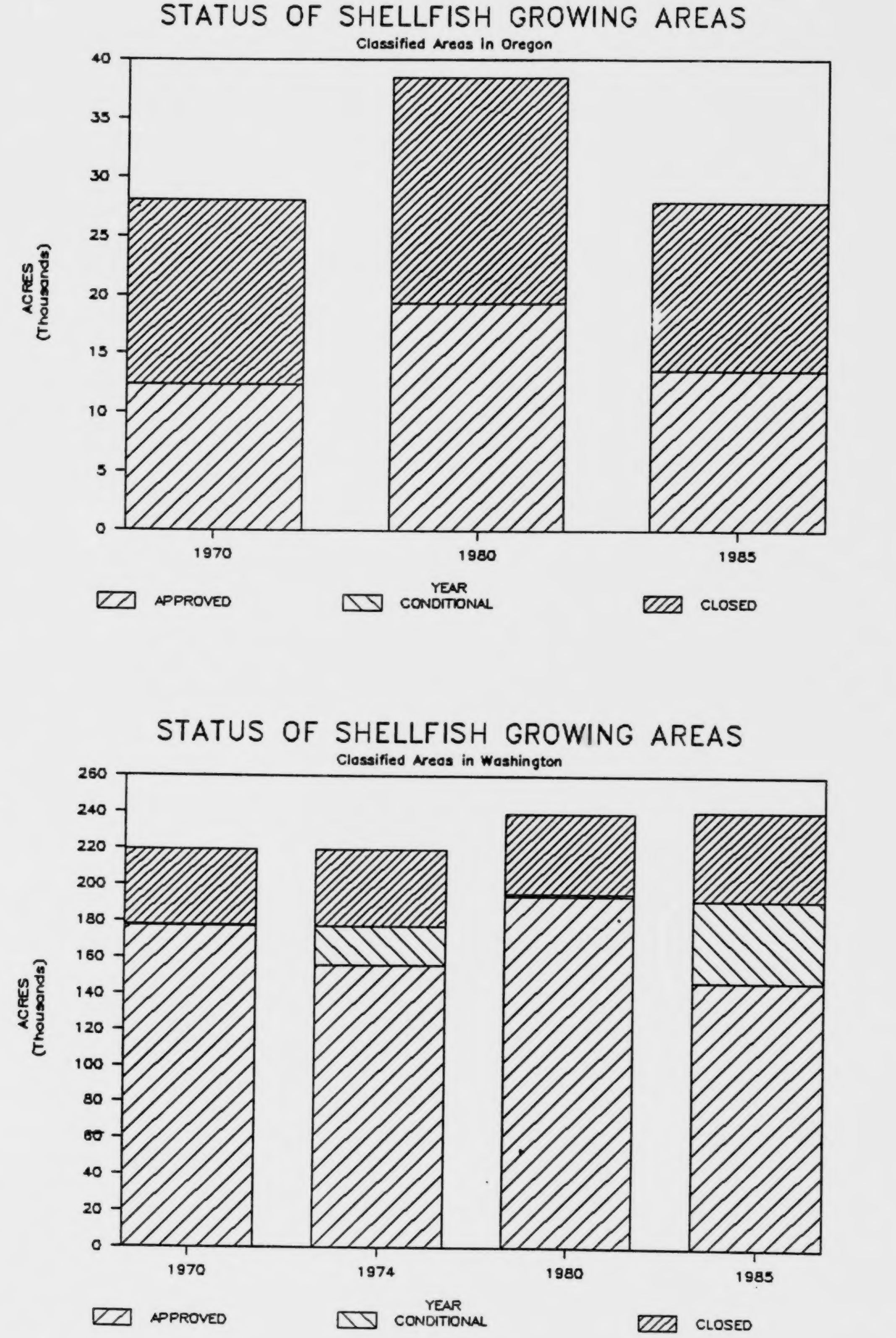


Figure 1. Trends in the status of classified shellfish growing areas in Washington and Oregon.

Table 6

Status of Classified Shellfish Beds in Washington State, 1985

Values are in acres.

Area	*Approved*	*Prohibited*	*Conditional*	*Restricted*	*Totals*
Strait of Georgia					
Bellingham Bay	0	1723	0	0	1723
Samish Island	2424	0	0	0	2424
Similk Bay	2616	0	0	0	2616
Portage Island	510	0	0	0	510
Lummi Bay	2487	51	0	0	2538
Drayton Harbor	0	0	319	0	319
Point Roberts	191	0	0	0	191
Westcott Bay	255	0	0	0	255
East Sound	140	0	0	0	140
Henry Island	149	0	0	0	149
Shoal Bay	276	0	0	0	240
Totals	**9048**	**1774**	**319**	**0**	**11,141**
Strait of Juan de Fuca					
Dungeness	1183	0	0	0	1183
Port Angeles	0	2275	0	0	2275
Sequim Bay	2080	337	0	0	3417
Totals	**4263**	**2612**	**0**	**0**	**6875**
Admiralty Inlet					
Livingston Bay	6120	2550	0	0	8670
Skagit Bay	8242	0	0	0	8242
Penn Cove	0	1020	439	0	1459
Discovery Bay	9139	0	0	0	9139
Port Townsend	459	0	0	0	459
Hadlock	31	0	0	0	31
Oak Bay	367	0	0	0	367
Kilisut Harbor	1112	0	0	0	1112
Liplip Point	306	0	0	0	306
Olele Point	50	0	0	0	50
Useless Bay	571	0	0	0	571
Everett	0	2999	0	0	2999
Mats Mats	15	0	0	0	15
Colvos	204	0	0	0	204
Squamish	82	0	0	0	82
Case Shoal	112	0	0	0	112
Sisters	112	0	0	0	112
Thorndyke	245	0	0	0	245
Toandos Penninsula	2142	0	0	0	2142
Big Beef	408	0	0	0	408
Lone Rock	255	0	0	0	255
Misery	40	0	0	0	40
Stavis	459	0	0	0	459
Triton Cove	204	0	0	0	204
McDaniel Cove	82	0	0	0	82
Duckabush	214	0	0	0	214
Sylopash	612	0	0	0	612
Quilcene	918	204	0	0	1122
Bolton Penninsula	143	0	0	0	143
Little Boston	286	0	0	0	286
Indianola	469	0	0	0	469
Admiralty Inlet *(continued)*					
Suquamish	194	0	0	0	194
Agate Point	122	0	0	0	122
Port Orchard	2183	0	0	0	2183
Brownsville	30	0	0	0	30
Liberty Bay	0	2417	224	0	2641
Elliott Bay	0	1907	0	0	1907
Totals	**35,928**	**11,097**	**663**	**0**	**47,688**
Puget Sound					
Burley Lagoon	0	480	0	0	480
Miller Creek	0	93	0	0	93
Fox Island	51	0	0	0	51
Filucy Bay	60	0	0	0	60
Nisqually Reach	122	0	0	0	122
Wilson Point	316	0	0	0	316
McMichen	40	0	0	0	40
Oakland Bay	82	1224	0	0	1306
Allen Bank	153	0	0	0	153
Dolphin Point	306	0	0	0	306
Glen Acres	143	0	0	0	143
Sinclair Inlet	0	3233	0	0	3233
Ostrich Bay	0	836	0	0	836
Elliot Bay	0	1196	0	0	1196
Olympia	0	1081	0	0	1081
Commencement Bay	0	5579	0	0	5579
Glen Cove	0	46	0	0	46
Wyckoff Shoal	592	0	0	0	592
Nisqually Flats	520	0	0	0	520
Lilliwaup	153	0	0	0	153
Musquett	214	0	0	0	214
Annas Bay	979	0	0	0	979
Case Inlet	1387	0	0	0	1387
Vaughn Bay	275	0	0	0	275
Oakland Bay	71	0	0	0	71
McLane	20	0	0	0	20
Dougall Point	0	194	0	0	194
Henderson	0	163	0	0	163
Peale Passage	500	0	0	0	500
Eld Inlet	31	0	0	0	633
Oyster Bay	2907	0	0	0	2907
Hood Canal	520	0	0	0	520
Squaxin Passage	979	0	0	0	979
Totals	**10,421**	**14,125**	**602**	**0**	**25,148**
Grays Harbor	**0**	**16761**	**43085**	**0**	**59,846**
Willapa Bay	**87402**	**2552**	**0**	**0**	**89,954**
Columbia River-Destruction Island	**65**	**0**	**0**	**0**	**65**

its use as a means of conveying to the public the nature and extent of water quality problems. This drawback can be partially overcome by using the WQI in association with other indicators with which the public can more readily identify.

ESD will be assisting in generating WQI values for key and representative stream reaches for inclusion into future Environmental Management Reports. The management goal for this indicator would be maintenance or improvement of water quality in each segment, with no exceedances of water quality criteria for any of the parameters used in computing the index.

7. Pacific Northwest Rivers Study

The Pacific Northwest Rivers Study generated a major data base which should be used as a Region-wide indicator (excluding Alaska, which was not included in the study). The study was initiated to assess the significance of river segments for a variety of environmental values. The express purpose of the study was to identify environmental and institutional considerations which might have a bearing on hydropower development in the Pacific Northwest. Information produced through this study will provide input into a variety of regional and state power planning and resource management activities. The inventory covered resident fish resources, wildlife resources, natural features, cultural features, and recreational resources. Of primary concern to EPA are the resident fish, wildlife, and recreational resources. In addition, BPA, which funded the study, is currently developing a comparable data base for anadromous fish.

Once completed, responsibility for keeping the data base current will be left up to state resource agencies. Funding from BPA grants will initially help states to maintain and update the data base.

Information from the data base can be analyzed over time to determine if the value of these resources are increasing, decreasing, or maintaining the status quo over time. A short-term management goal would be the maintenance or improvement of resource values, with a long-term goal of attaining potential resource values in each segment. Resource values have not yet been identified, however.

The information base developed during this study is available on diskettes and has been obtained by the Region. The output is extensive, thus the entire data base will not be included in this report. Instead, one page from the summary of the information on resource values for the state of Idaho is used as an example of the type of information available, and of the types of uses to which the information may be put (Appendix 2).

The rationale for using Idaho as a case example is that the recreational and resident fishery values have been proposed for use in that state to implement the water quality standards. Idaho has for the last two years been under pressure from EPA to adopt an antidegradation policy which meets minimum federal requirements. Before adopting a new policy, however, a task force consisting of representatives from state and federal agencies, the forest products industry, the agricultural community, environmental groups, and Indian tribes, has attempted to develop workable implementation procedures. One of the major issues facing the task force was to identify "high quality" waters which would be subject to the requirements of the new policy. Eventually, the task force decided to use the resource values resulting from the Pacific Northwest Rivers Study as the best indicator of where high value resident fishery and recreational uses exist. The result was development of a proposed classification system that, if used by the state, may have a profound effect on water quality management decisions.

Basin Pilot Projects

Many of the potential indicators considered by OWP were very specific to certain types of pollution problems. These indicators would not be valuable when applied to the Region or a state as a whole, but may be the best parameter to track in terms of observing the results of pollution control efforts in a particular waterbody (whether that waterbody is an entire estuary, a small embayment, a river basin, a stream reach, or whatever).

To explore the concept of using indicators which reflect the particular environmental problems present in a specific basin, and as an opportunity to test the use of innovative indicators, the OWP developed sets of indicators for the Yakima and Tualatin River basins. In defining the indicators to be used in these basins, we have attempted to focus on those factors limiting the full attainment of beneficial uses. This "limiting factor" approach will provide the focus for future OWP development of environmental indicators. The OWP expanded the pilot basin effort to also include the Grays Harbor estuary and Chehalis River basin. The Grays Harbor/Chehalis River effort will not be complete, however, until the Fall of 1989, when the Washington Departments of Fisheries and Ecology complete their joint studies on the cause of reduced survival in coho salmon originating in the Chehalis River basin.

Yakima River Basin

Numerous human activities in the Yakima basin potentially affect beneficial uses. These activities cause increased sedimentation, removal of streambank vegetation, lowering of streambank stability, temperature increases, nutrient increases, elevated levels of toxic pollutants, and other impacts.

Indicators:

1. **Number of Smolts Produced**

Yakima Indian Nation fishery biologists have compiled statistics on the total number of wild anadromous fish smolts produced in the basin. This indicator reflects the overall production of the basin relative to its estimated production potential, and thus integrates concerns on the physical, chemical, and biological integrity of the system. This measure should be of great social and economic interest to the public, with people able to readily grasp its significance. Therefore, it is potentially a good indicator for use on a Region-wide basis. Unfortunately, information on smolt production is not presently available throughout the Region. If the Yakima pilot evaluation demonstrates that this is a useful indicator, state water quality agencies and EPA may wish to encourage other agencies to obtain more widespread information on smolt production.

Production of salmon smolts will vary not only in response to natural phenomena, but also to a broad range of human activities ranging from logging and agricultural activities, to hydropower projects, to ocean harvest strategies. As such, it serves as an indicator of society's overall effort to restore and maintain surface water resources. While this makes it more difficult to assess the results of any single pollution control program, it also provides insight into the relationship of EPA programs to those of other agencies. This may affect how states and EPA conduct and prioritize pollution control efforts. For example, if hydro developments are the limiting factor to smolt production in one basin, it may not make sense to undertake large-scale agricultural control programs in that basin, even though agricultural pollution degrades water quality. It may be more beneficial to focus efforts in another basin where water quality is less impacted by, as an example, past mining practices, but where greater resource returns are possible because the mining impacts are the factor limiting smolt production.

Estimates of the number of wild chinook and steelhead smolts produced in the Yakima River basin are available for 1983 through 1986 (Figure 2). Also presented are the number of spring chinook returning to the Yakima River basin between 1957 and 1986 (Figure 3), and the total estimated egg deposition for chinook salmon in the basin for

1981-1986 (Figure 4). This latter information is included as it in part helps explain the pattern of smolt production. It is estimated that the production capability for the basin is upwards of 2,000,000 smolts. The desired management objective would be to attain this level of smolt production.

2. **Temperature**
Rearing juvenile salmon are typically absent from the lower 108 miles of the Yakima River in July and August. This is reportedly due to high temperatures. Temperature increases above natural levels primarily result from loss of streambank vegetation, reductions in water volume during the summer months, and irrigation return flows.

While temperature can easily be tracked over time to determine trends, it is a surrogate in that it does not directly measure impacts to beneficial uses. Temperature data collected during a 1986 U.S.G.S. synoptic survey of water quality in the Yakima River is presented in Figure 5. Temperatures above 19-20°C can adversely affect trout and salmon. The Washington Water Quality Standards allow temperatures of 21°C in the lower Yakima River (this is a special condition in the standards). As can be seen from the figure, temperatures in the lower Yakima River exceed both the levels which adversely affect salmonids and the Washington Water Quality Standards. The management objective for this indicator should be the reduction of temperature to levels below those known to adversely affect salmonids wherever possible.

3. **Nutrients**
Significant sources of nutrients to the Yakima are irrigation return flows, sewage treatment plant discharges, and urban and agricultural runoff. The profound impact of the irrigation return flows is evident from the nutrient trend data compiled by the U.S.G.S. during their 1986 synoptic survey. The sudden and drastic increase seen in the downstream portions of the river are the direct result of major return flows (Figures 6-10).

The high nutrient concentrations in the lower Yakima River contribute to excessive growths of algae and macrophytes. This may result in impairment of aesthetic and recreational enjoyment of river waters. The management goal for this indicator should be the reduction of nutrients to levels which no longer adversely affect beneficial uses.

Since the nutrients come primarily from irrigation waters, nutrient concentrations in the river waters may correlate with concentrations of pesticides used for agricultural purposes. The U.S.G.S. is pursuing efforts to establish such a relationship.

U.S.G.S. is proposing to conduct long-term monitoring of both temperature and nutrient concentrations in the Yakima basin as part of its National Water Quality Assessment. Thus these indicators can be tracked over an extended time.

4. **Riparian Vegetation Inventory**
While available only for portions of the Yakima River basin, the status of riparian vegetation can be a valuable indicator of the quality of stream habitats. Logging, uncontrolled grazing, and urbanization along streambanks can significantly degrade the quality of streamside habitat by destroying the vegetative cover. Destruction of riparian vegetation will reduce streambank stability, causing increased sedimentation and changing stream morphology. Shallower, wider streams may result, which are more susceptible to high temperatures, flooding, and erosion. Increased sedimentation also adversely affects salmonid spawning areas, and may fill in pools and other valuable habitat. Bank overhangs and overhanging vegetation are lost, resulting in less protection from predators and less food for rearing fish.

On the Yakima River, the Washington Department of Fisheries (WDF) has conducted some limited surveys of riparian habitat. Tracking the riparian vegetation over time will allow evaluation of the effectiveness of efforts to restore the quality of instream habitat. Efforts to map riparian vegetation have focused on identifying areas which have been disturbed, and are still incomplete at this time. As a result, the data from WDF has not been put on a map for inclusion in this report. However, OWP is strongly encouraging WDF and USGS to complete and compile this information, as a critical component of aquatic life habitat.

5. **Toxics Concentrations**
The importance of agriculture in the Yakima basin has resulted in widespread application of pesticides to protect crops. Surveys by the Washington Department of Ecology have shown that, despite a ban on the use of DDT, significant quantities of DDT and its metabolites, along with PCBs, are still present in the sediments and organisms of the Yakima River in high concentrations relative to other areas of the state of Wahington (Figures 11-15). These contaminants, and the pesticide dieldrin, are at or close to levels which impair aquatic life (they often exceed EPA's chronic criteria for aquatic life in tributary streams) and which may be of concern to humans eating fish from the river and its tributaries (see Figures 16-18).
Pollutant concentrations increase downstream, and are higher during the irrigation season, reflecting their agricultural origin. Continued measurement of pesticide levels will indicate when inputs of these pesticides to the river decline to levels at which there are no longer any aquatic life or human health concerns. It will also provide a baseline and early warning system should levels of other toxic pollutants still being used begin to reach levels which threaten aquatic life or human health.

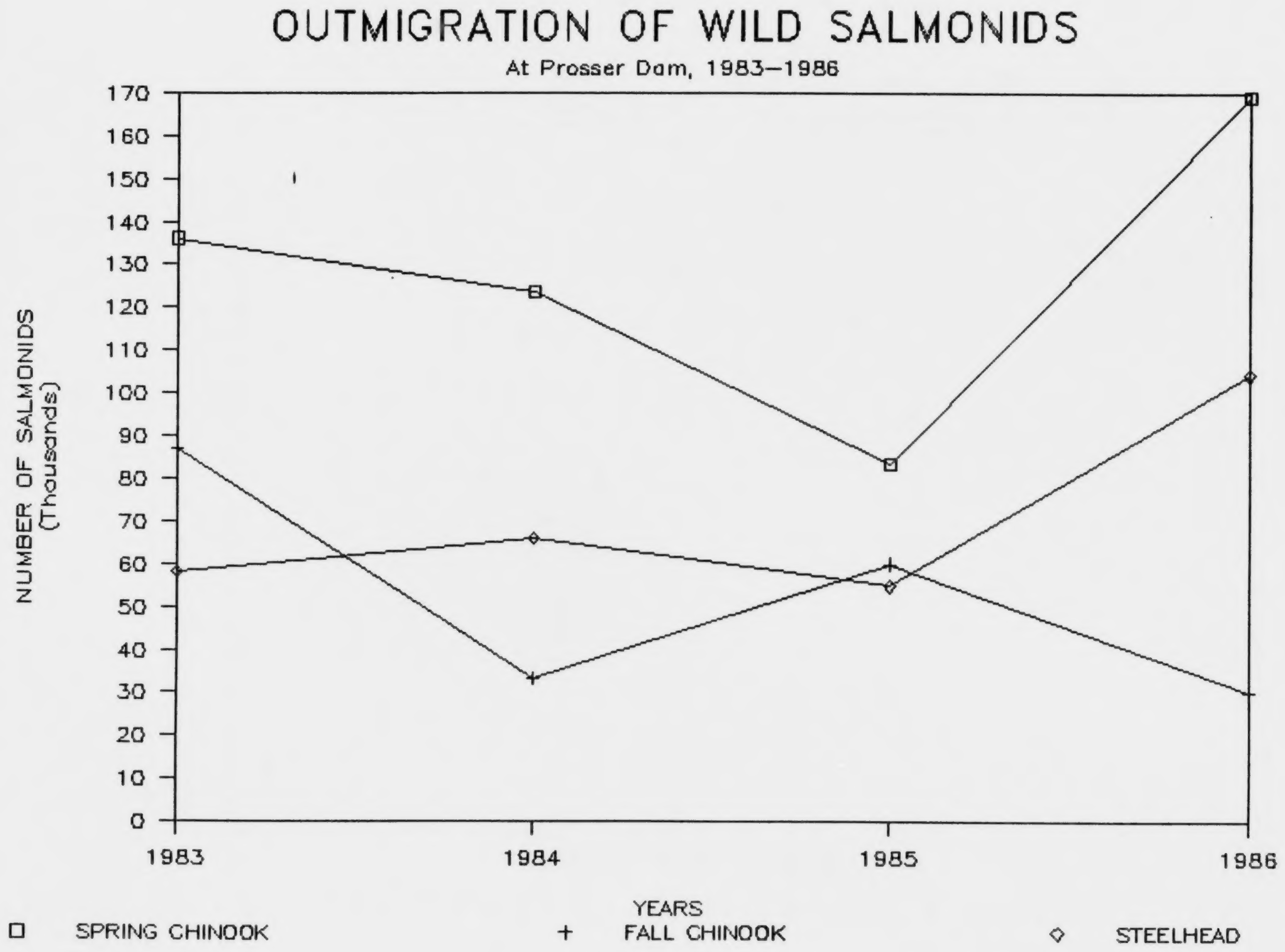


Figure 2. Estimated outmigration of wild salmonids at Prosser Dam, 1983-1986.

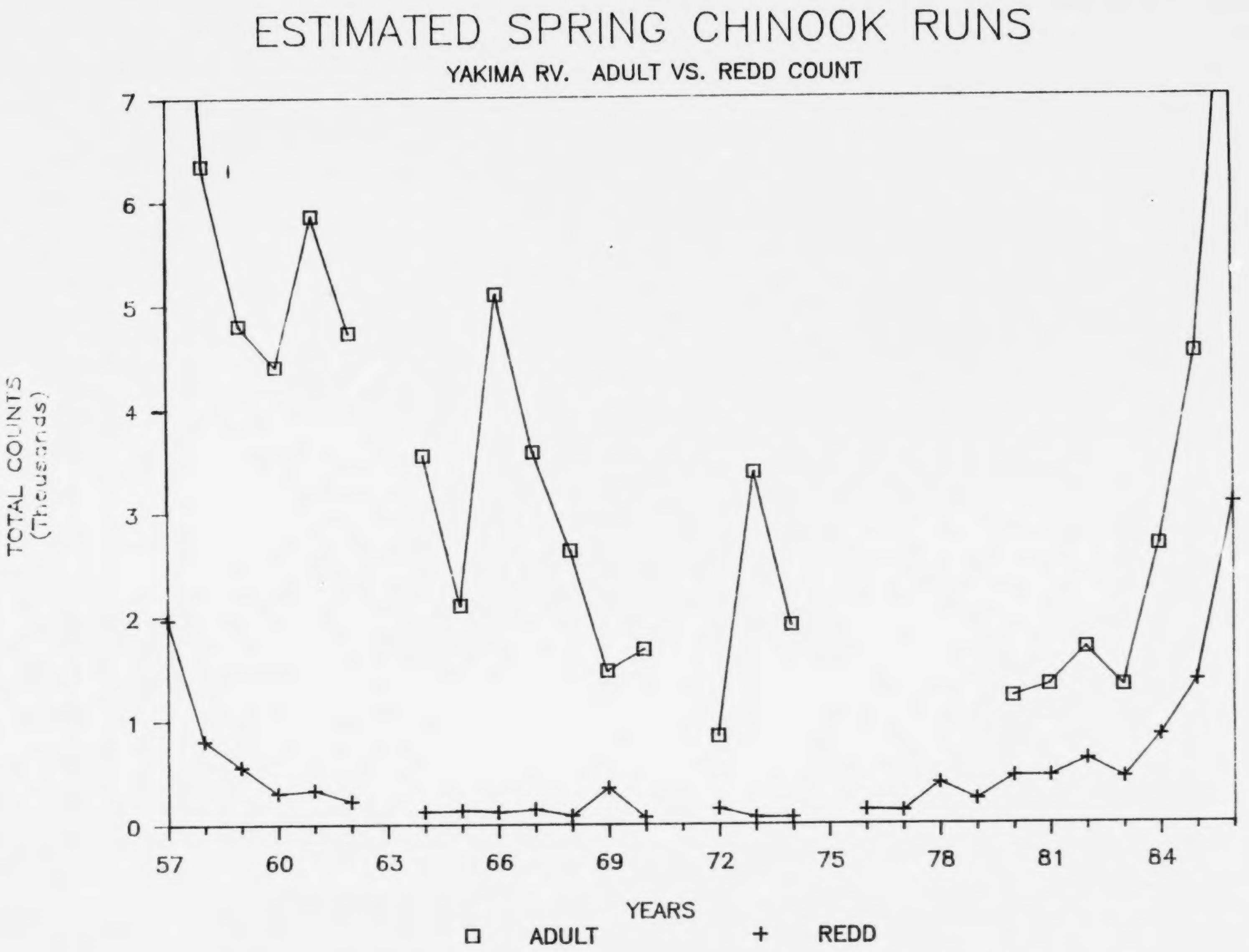


Figure 3. Estimated spring chinook runs and total number of redds in the Yakima River Basin, 1957-1986.

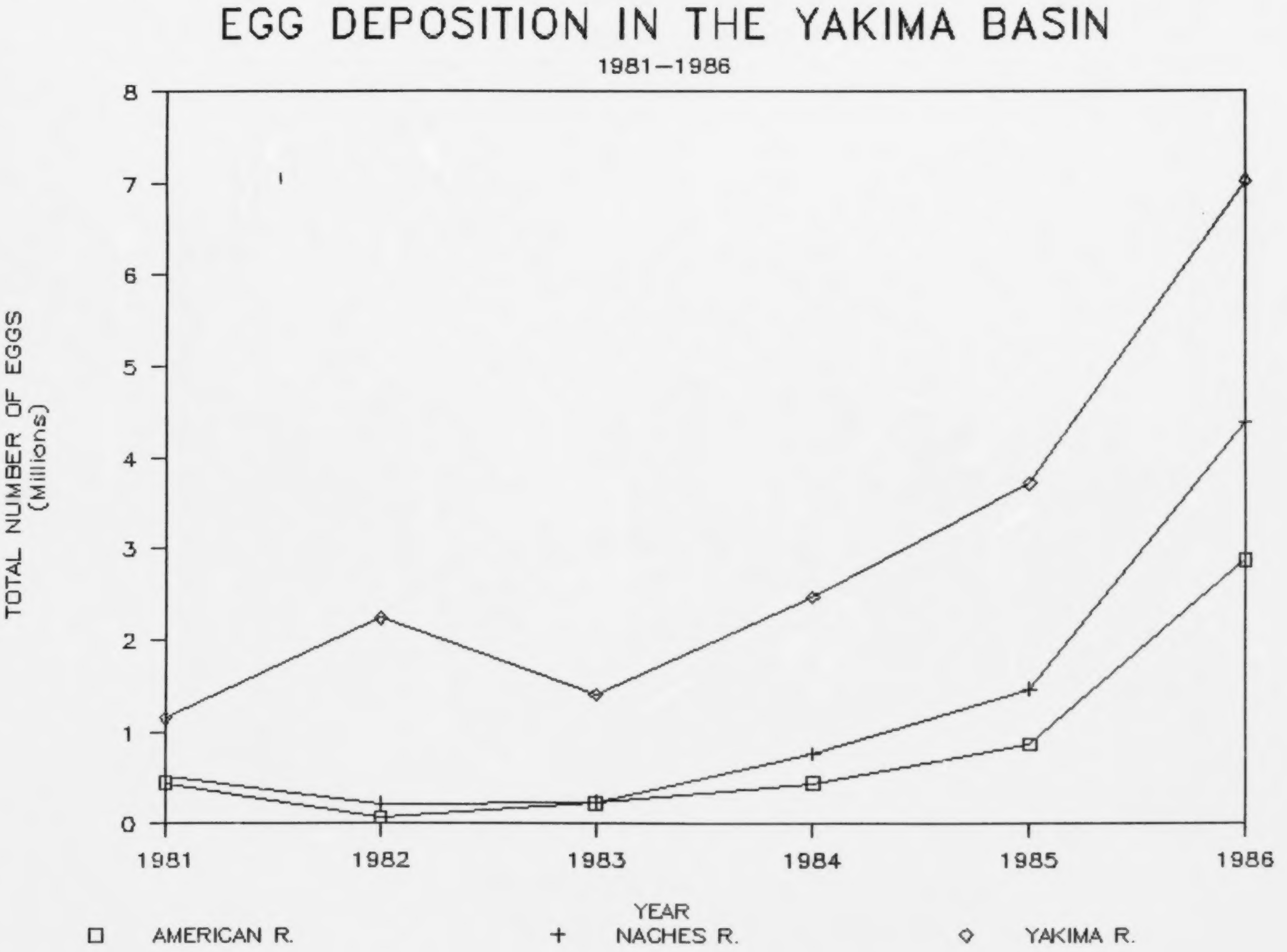


Figure 4. Estimated total egg deposition in the Yakima River Basin, 1981-1986.

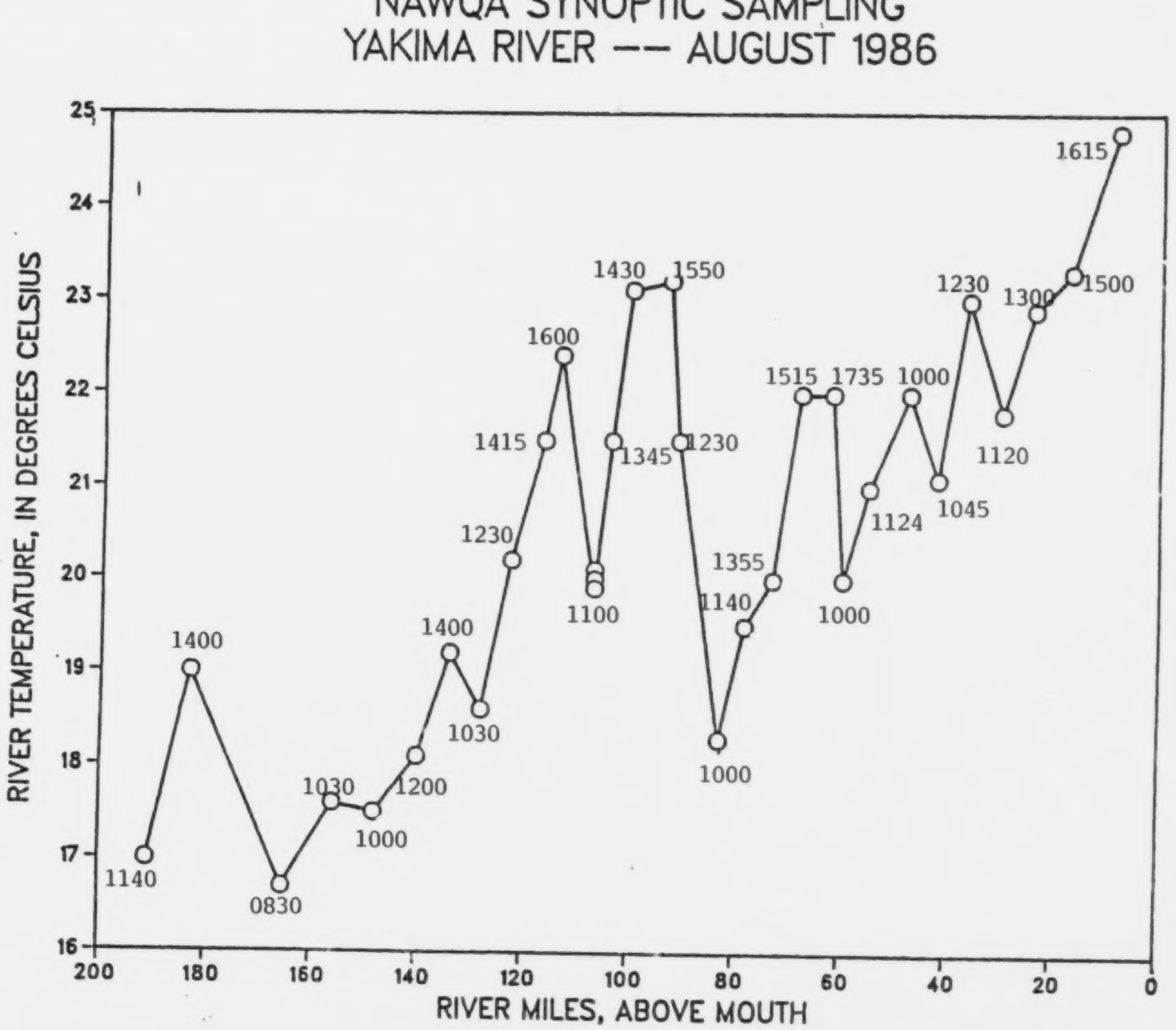


Figure 5. Temperature measurements for the Yakima River during the August 1986 synoptic sampling by the U.S.G.S. The synoptic survey was part ot the U.S.G.S. National Water Quality Assessment (NAWQA) Pilot Survey of the Yakima River basin. Numbers represent sampling times (2400 hrs).

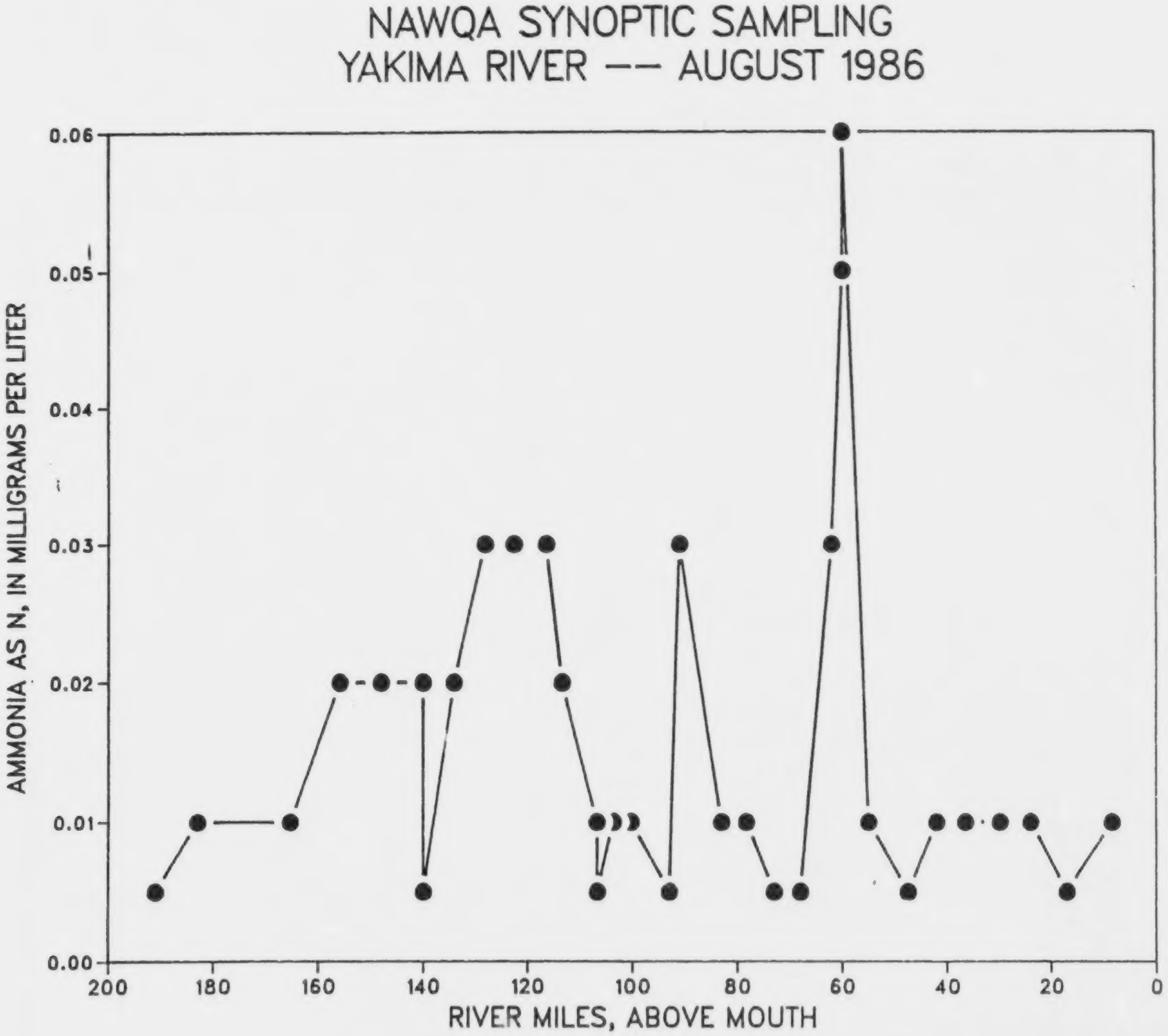


Figure 6. Ammonia concentrations in the Yakima River during the U.S.G.S. August 1986 synoptic survey.

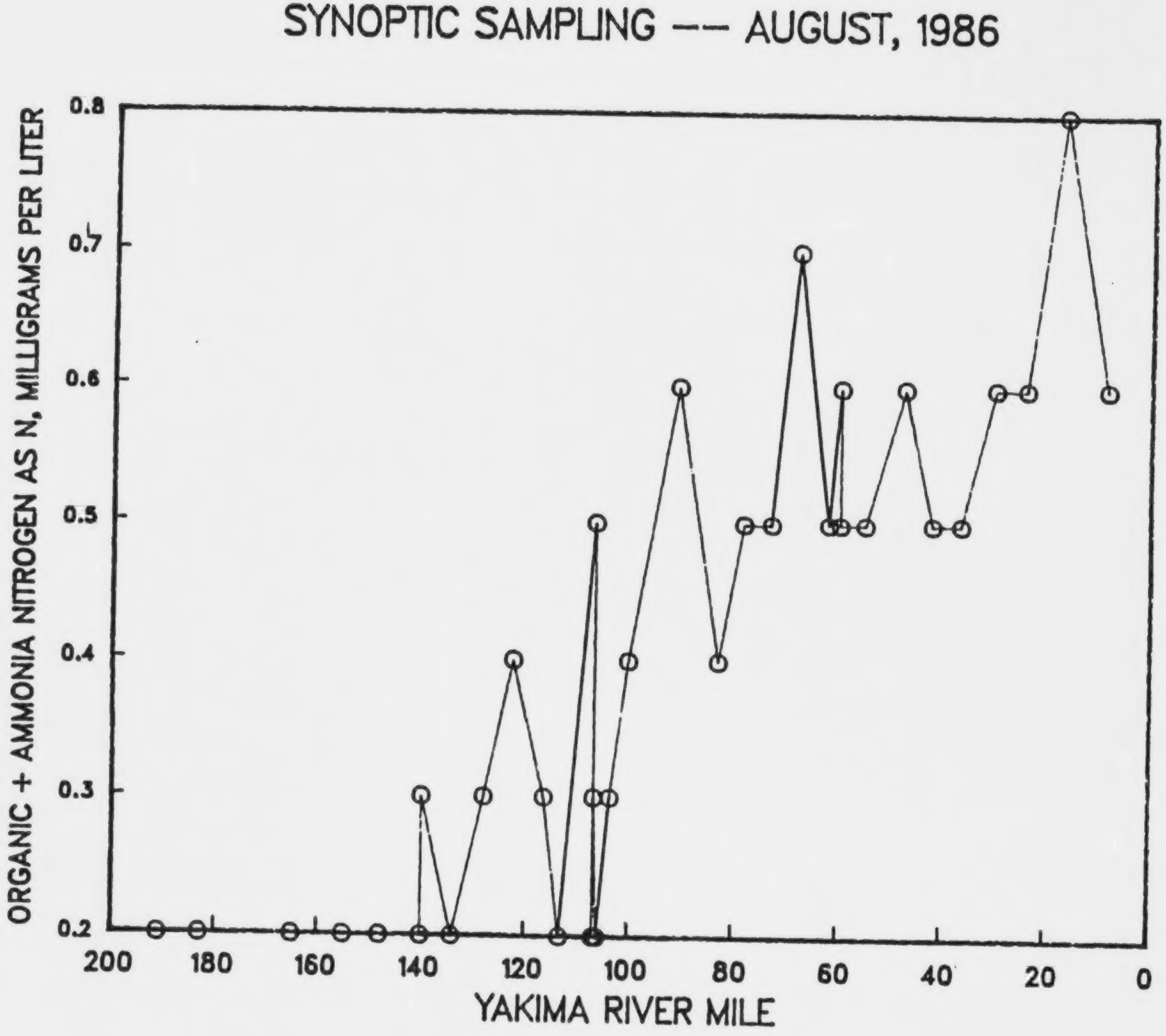


Figure 7. Organic and ammonia nitrogen concentrations in the Yakima River during the U.S.G.S. August 1986 synoptic survey.

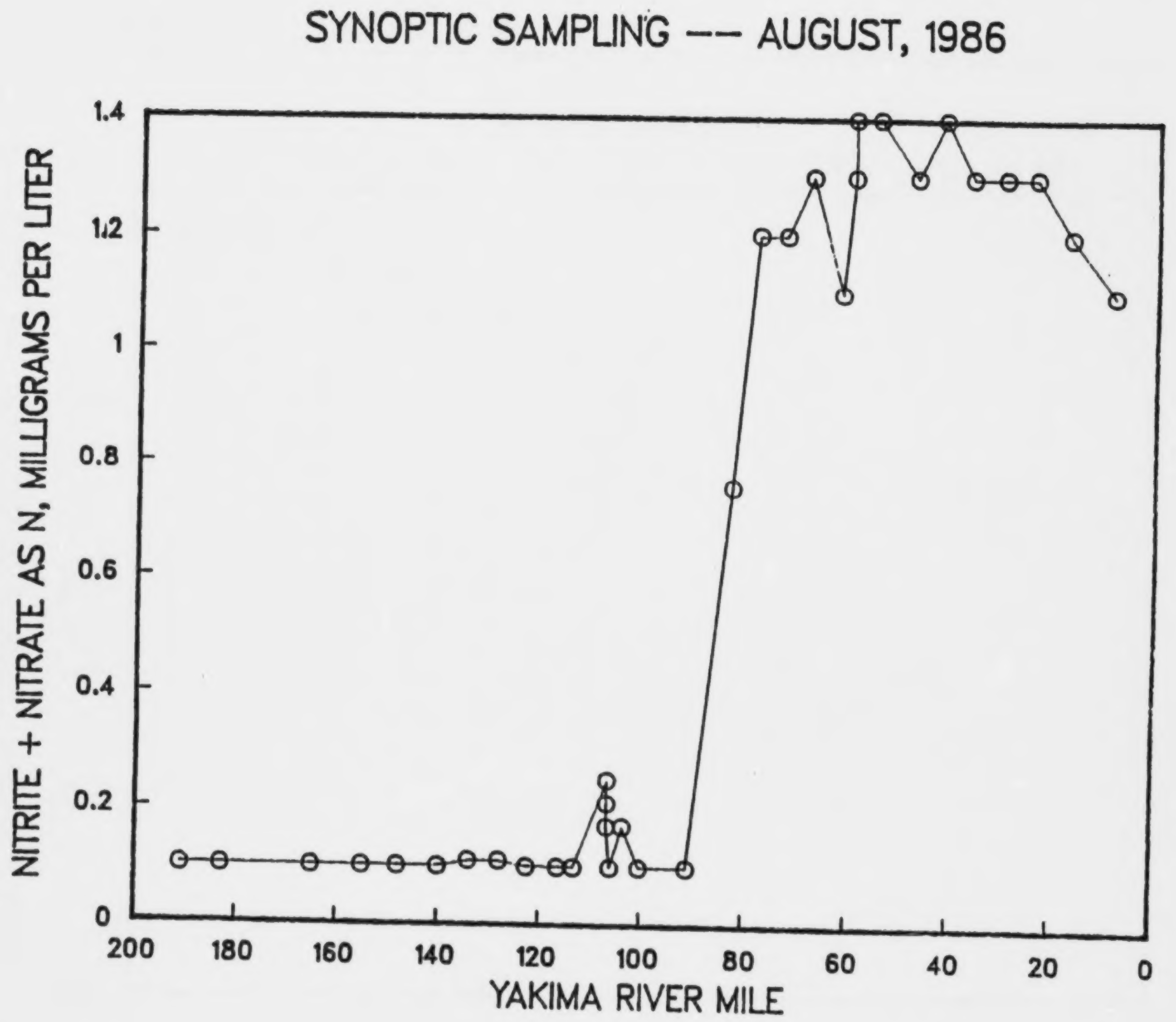


Figure 8. Nitrite + Nitrate concentrations in the Yakima River during the U.S.G.S August 1986 synoptic survey.

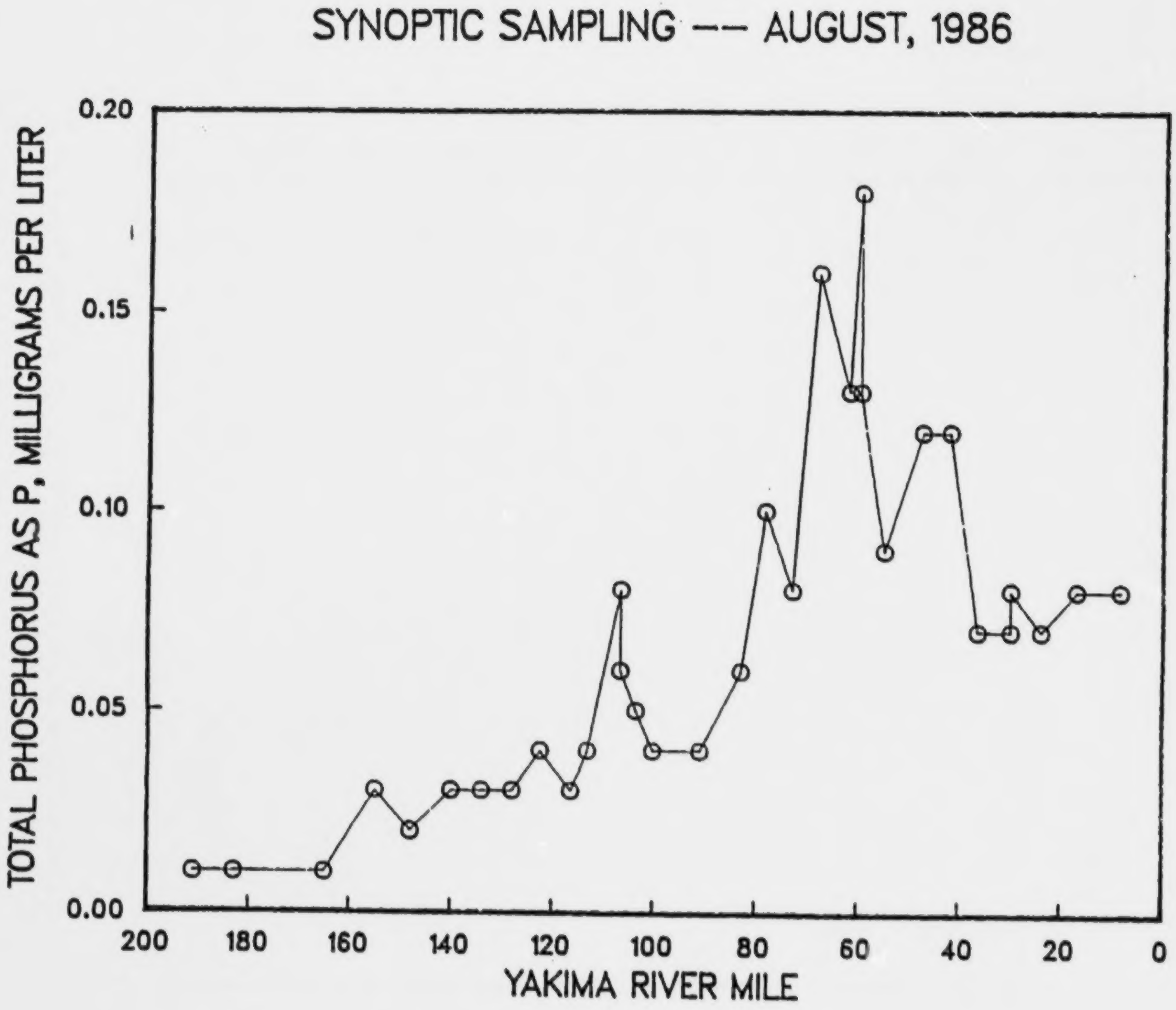


Figure 9. Total Phosphorus concentrations in the Yakima River during the U.S.G.S August 1986 synoptic survey.

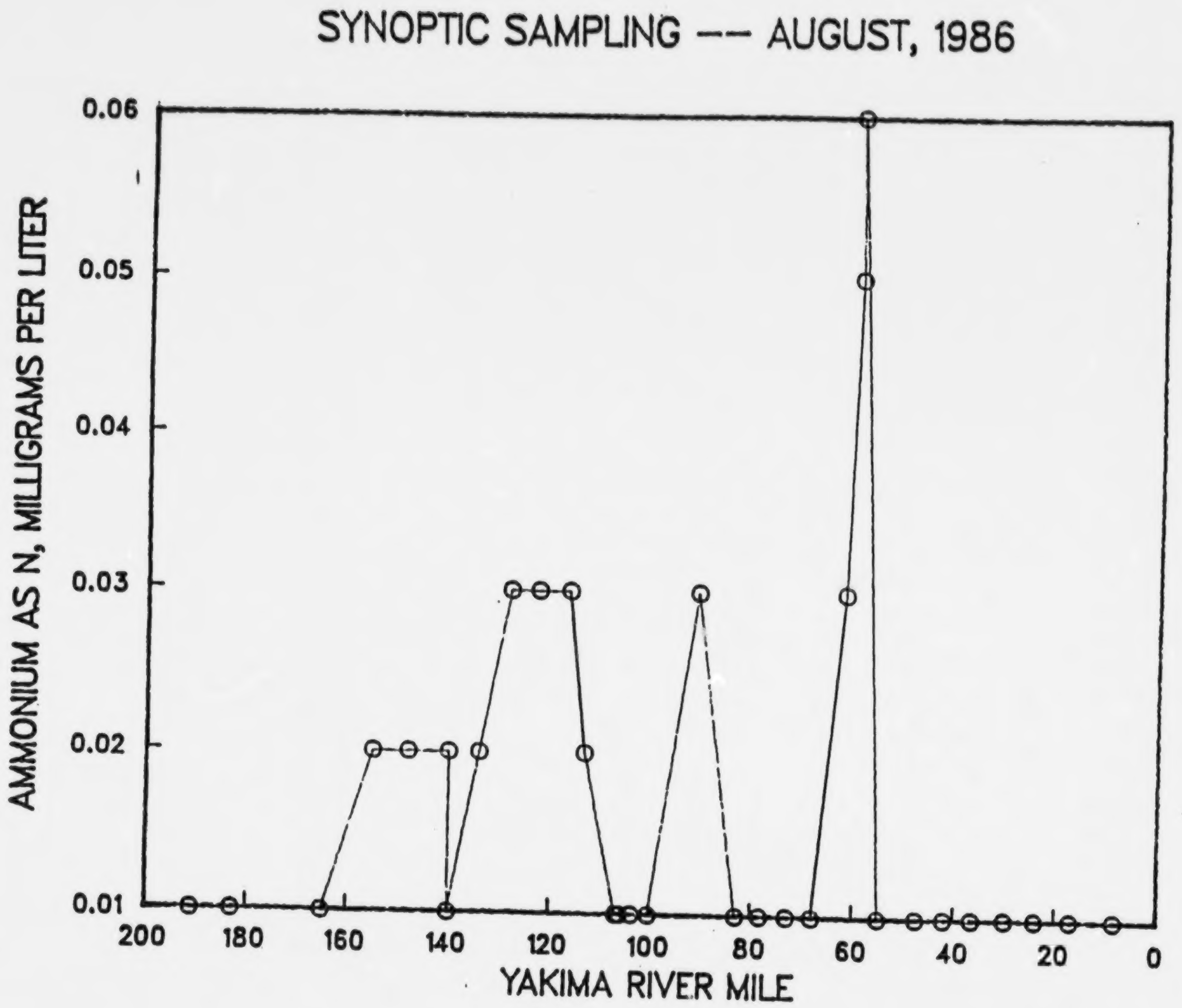


Figure 10. Ammonium concentrations in the Yakima River during the U.S.G.S. August 1986 synoptic survey.

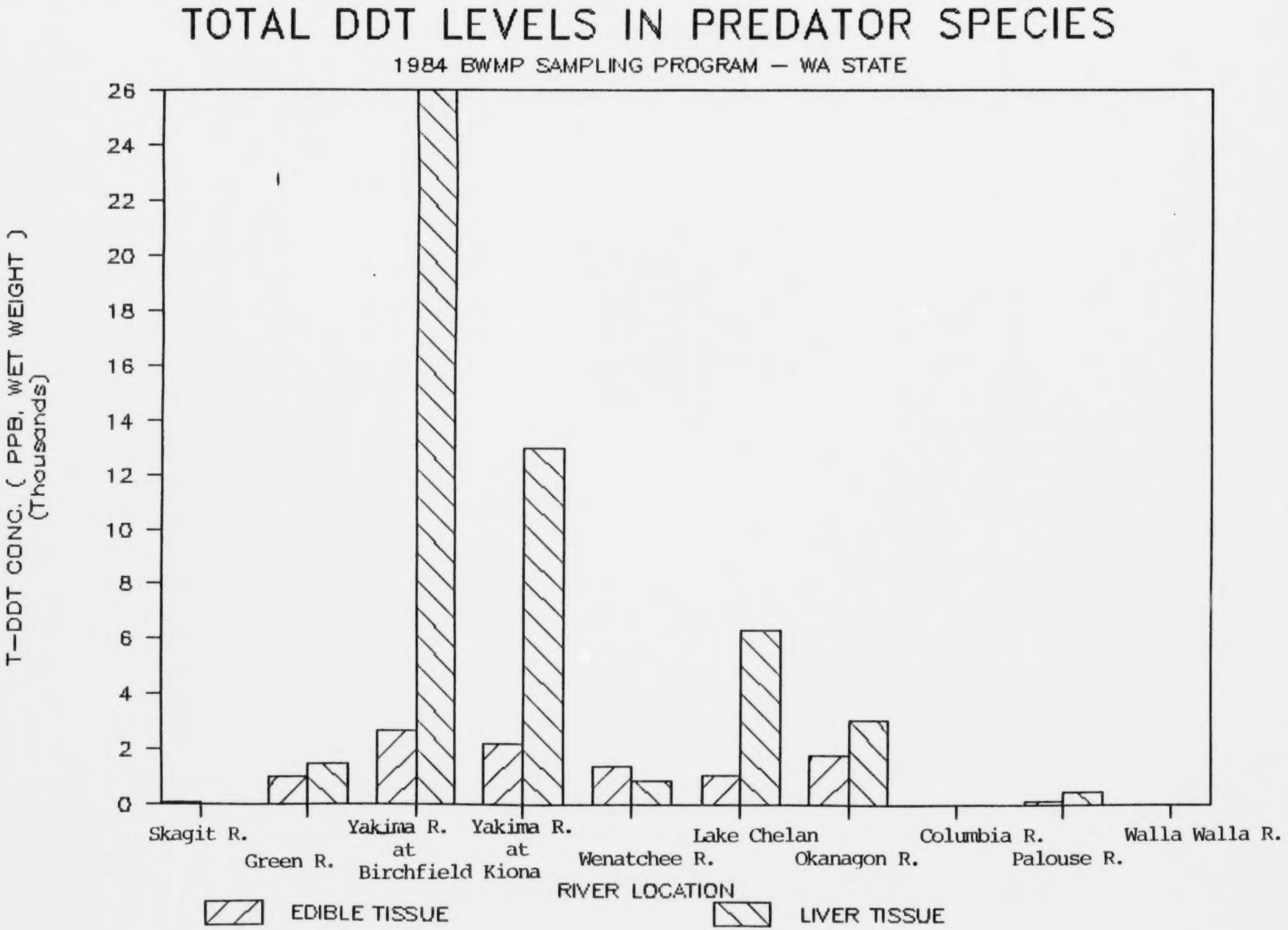


Figure 11. Total DDT levels in predator fish species in rivers sampled as part of the state of Washington's 1984 Basic Water Monitoring Program (BWMP).

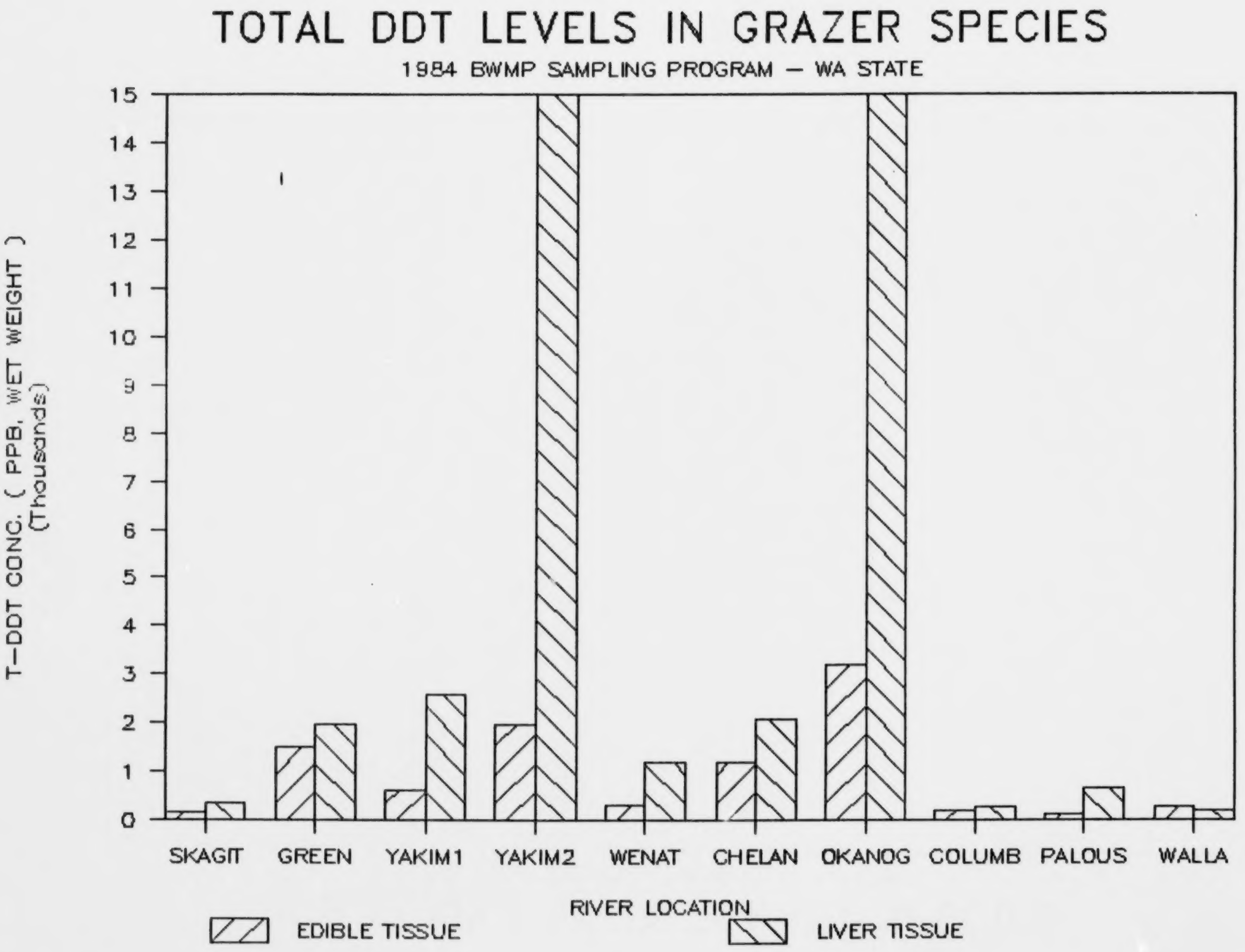


Figure 12. Total DDT levels in grazer fish species in rivers sampled during Washington's 1984 BWMP.

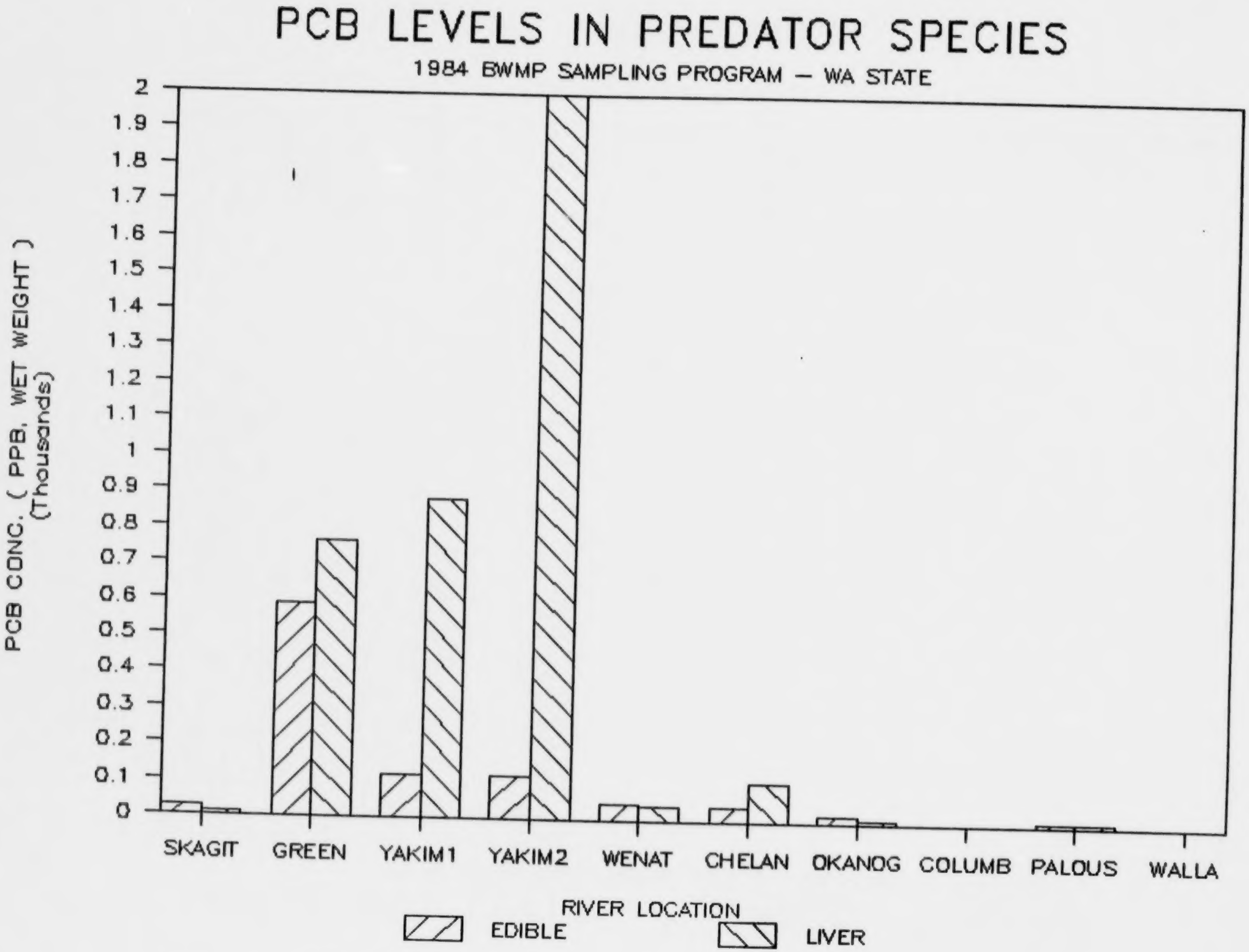


Figure 13. Total PCB levels in predatory fish species in rivers sampled during Washington's 1984 BWMP.

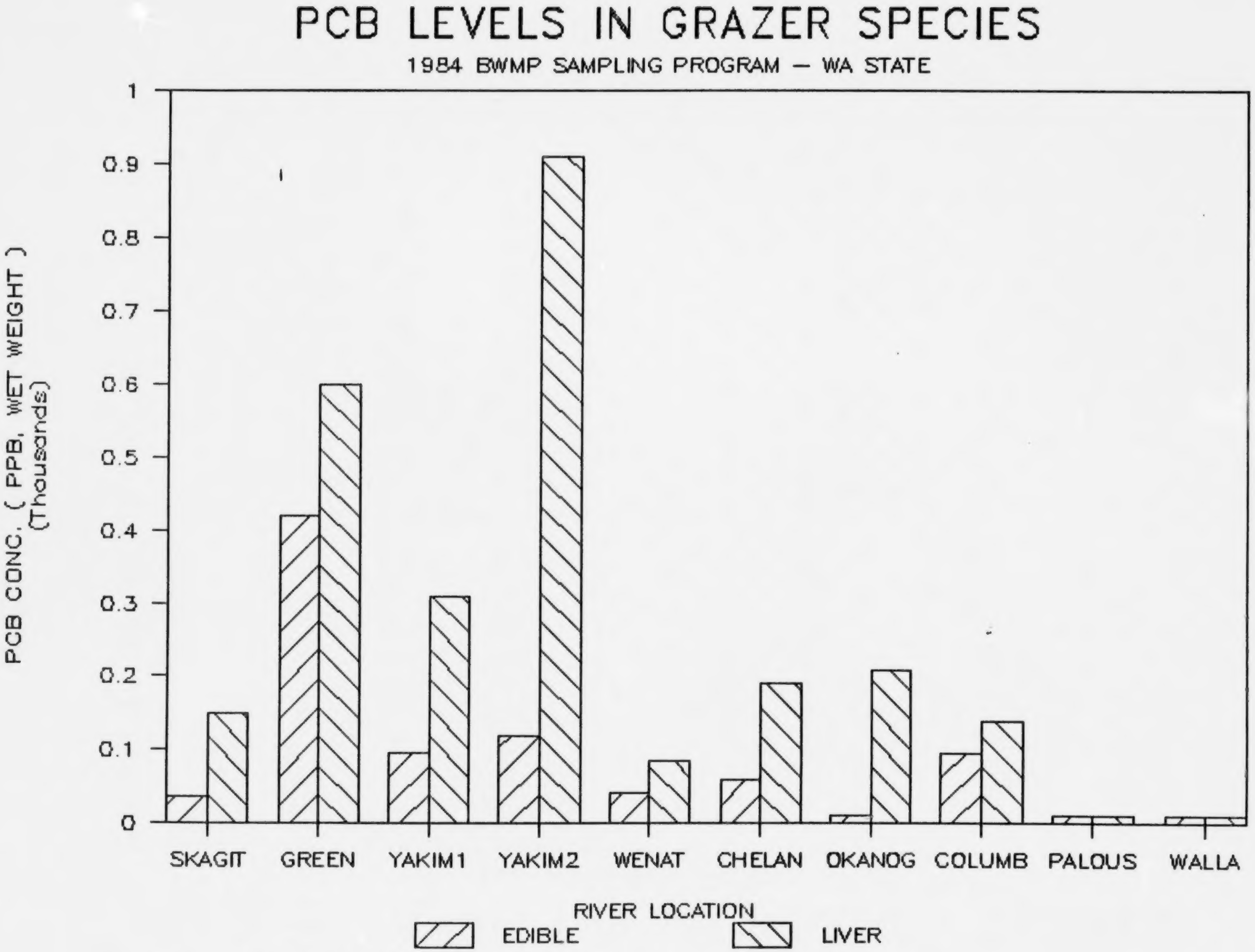


Figure 14. PCB levels in grazer fish species in rivers sampled during Washington's 1984 BWMP.

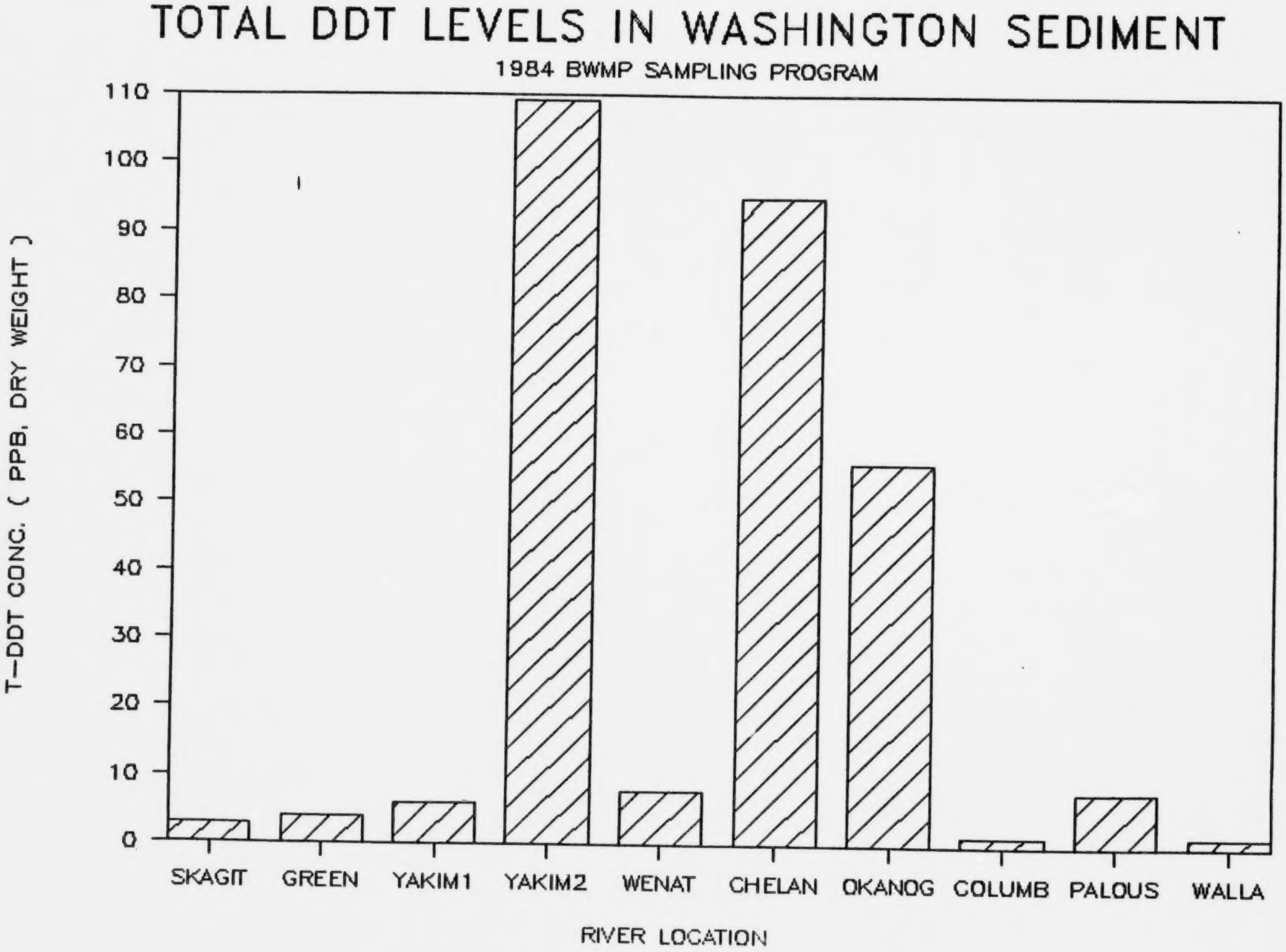


Figure 15. Total DDT levels in sediment from rivers sampled as part of the state of Washington's 1984 Basic Water Monitoring Program (BWMP).

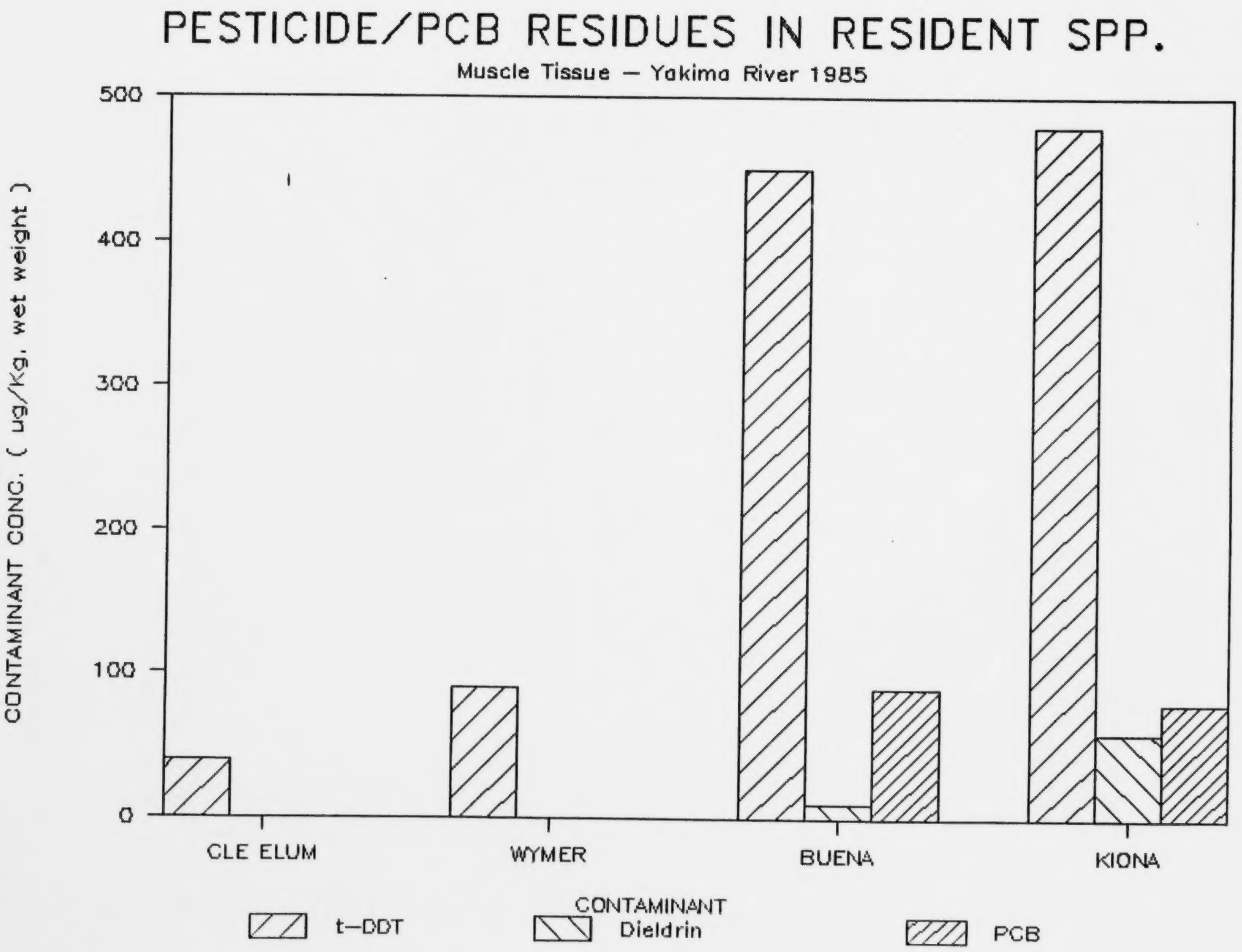


Figure 16. Pesticide and PCB concentrations in the muscle tissue of resident aquatic organisms from four locations in the Yakima River during 1985. Stations are arranged sequentially from upstream (on the far left) to downstream (on the far right).

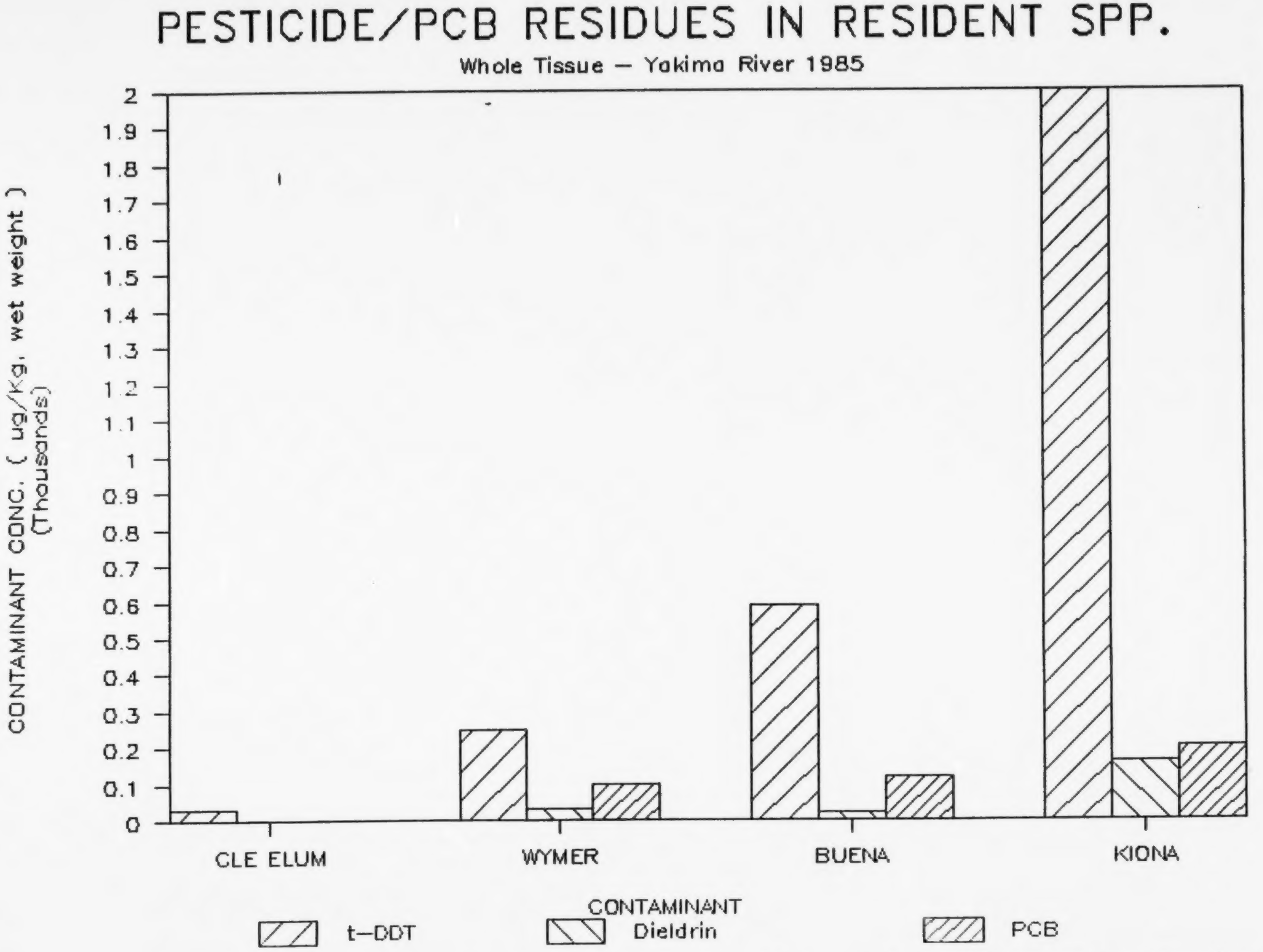


Figure 17. Pesticide and PCB concentrations in resident aquatic organisms from four locations in the Yakima River during 1985. Values shown reflect whole tissue concentrations.

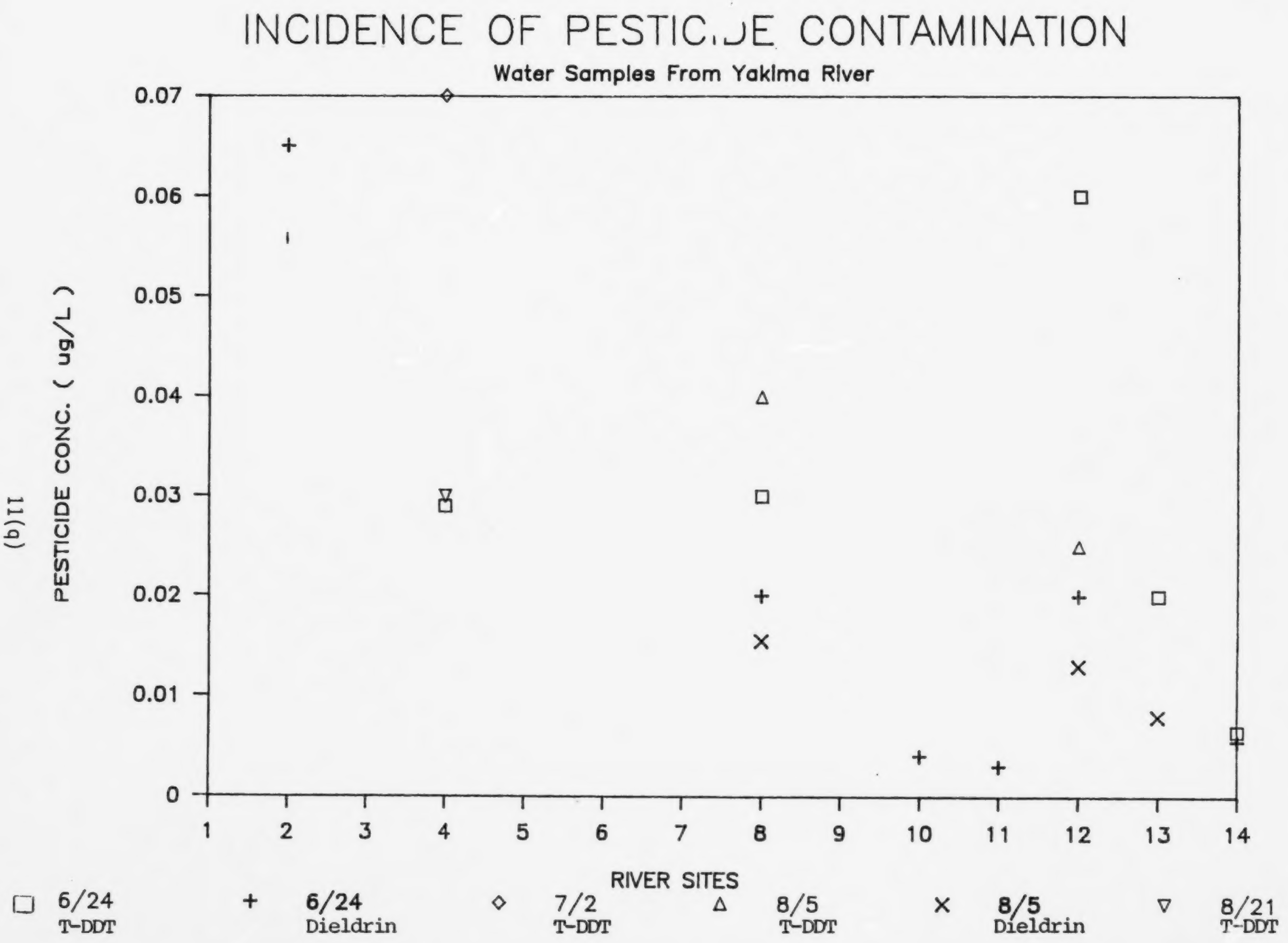


Figure 18. Concentrations of total DDT and dieldrin in water from the Yakima River and selected tributaries and irrigation return drains, June - October, 1985.

1 = Cle Elum 2 = Wilson Crk. 3 = Naches River 4 = Birchfield drain 5 = Wide Hallow Crk.
6 = Ahtanum Crk. 7 = Parker 8 = Granger drain 9 = Marion drain 10 = Toppenish Crk.
11 = Satus Crk. 12 = Sulphur Crk. 13 = Spring/Snipes Crk. 14 = Kiona

Tualatin River Basin

The Tualatin River serves as an important resource to a growing population. Industries use the river for manufacturing. Farmers use the river for crop irrigation. Anglers and boaters use the river for recreation. The Tualatin provides drinking water to Forest Grove, Hillsboro, and Beaverton. These uses depend on good water quality.

The Tualatin's water quality, however, is a growing concern. Low dissolved oxygen caused by ammonia discharges from sewage treatment plants threatens aquatic life. Heavy algae growth in the slow-moving river is "fed" by nutrients, such as fertilizers, and discourages recreational use. There is also a concern about toxics in the river as new industry moves into the area.

Population in the Tualatin River basin has increased dramatically in recent years from 60,000 in 1950 to 250,000 today. Population is projected to reach 350,000 by the year 2000. Without taking significant actions to reduce pollution in the basin, the population growth alone will cause further degradation of water quality. The proposed indicators in the Tualatin River track known pollution problems. While a number of management actions have been taken in the past to reduce pollutant loadings, problems still remain. New indicators will probably be developed in the future, as new problems become evident. A current study by the Oregon Department of Environmental Quality included collection of sediment and fish tissue samples for analysis of toxic pollutants. Since the large population growth anticipated is likely to result in increased loading of toxics to the river, it would seem prudent to add the baseline levels of toxics as an additional indicator, once this information is available.

1. **Dissolved Oxygen Levels**

Fishing is a popular sport in the basin. Trout and bass need adequate levels of oxygen to live. Low levels of dissolved oxygen can eventually kill off fish and other aquatic life. The stretch of the Tualatin River below Rock Creek violates dissolved oxygen standards during the summer, when the river water level is low and temperatures are warm (Figure 19).

The low dissolved oxygen (DO) levels observed in the lower Tualatin River primarily result from the discharge of oxygen-demanding ammonia from two sewage treat plants. Intensive studies of the water quality problems in the Tualatin River are currently underway. A major goal of the study is to identify appropriate levels of ammonia which the river can assimilate without damaging aquatic resources.

The relationship between DO and ammonia concentrations is illustrated in Figure 19. The large inputs of ammonia from the two sewage treatment plants create obvious increases in ammonia concentrations in the river. These increases in ammonia, especially near the Rock Creek Treatment Plant, contribute heavily to the observed DO depression. As ammonia inputs to the river are reduced in the future, the DO levels should show a corresponding increase. The goal in reducing ammonia inputs would be to prevent levels of DO below the water quality criterion.

2. **Nutrients/Chlorophyll a:**

Excessive nutrient inputs to the Tualatin River cause blooms of algae and macrophytes, which in turn affect use of the river for recreation. Figure 20 indicates that the two sewage treatment plants also are major contributors of nutrients to the river. Other sources include agricultural and urban runoff.

Oregon recently adopted a chlorophyll a action level. Measuring chlorophyll a indicates the amount of phytoplankton in the river. As nutrient inputs become excessive, the amount of phytoplankton in the water also becomes excessive. This is reflected by the measurements of chlorophyll a concentrations in the Tualatin River during summer of 1986 (Figure 20). As nutrient inputs to the river are reduced in the future, chlorophyll a levels would be expected to remain below the state's action level.

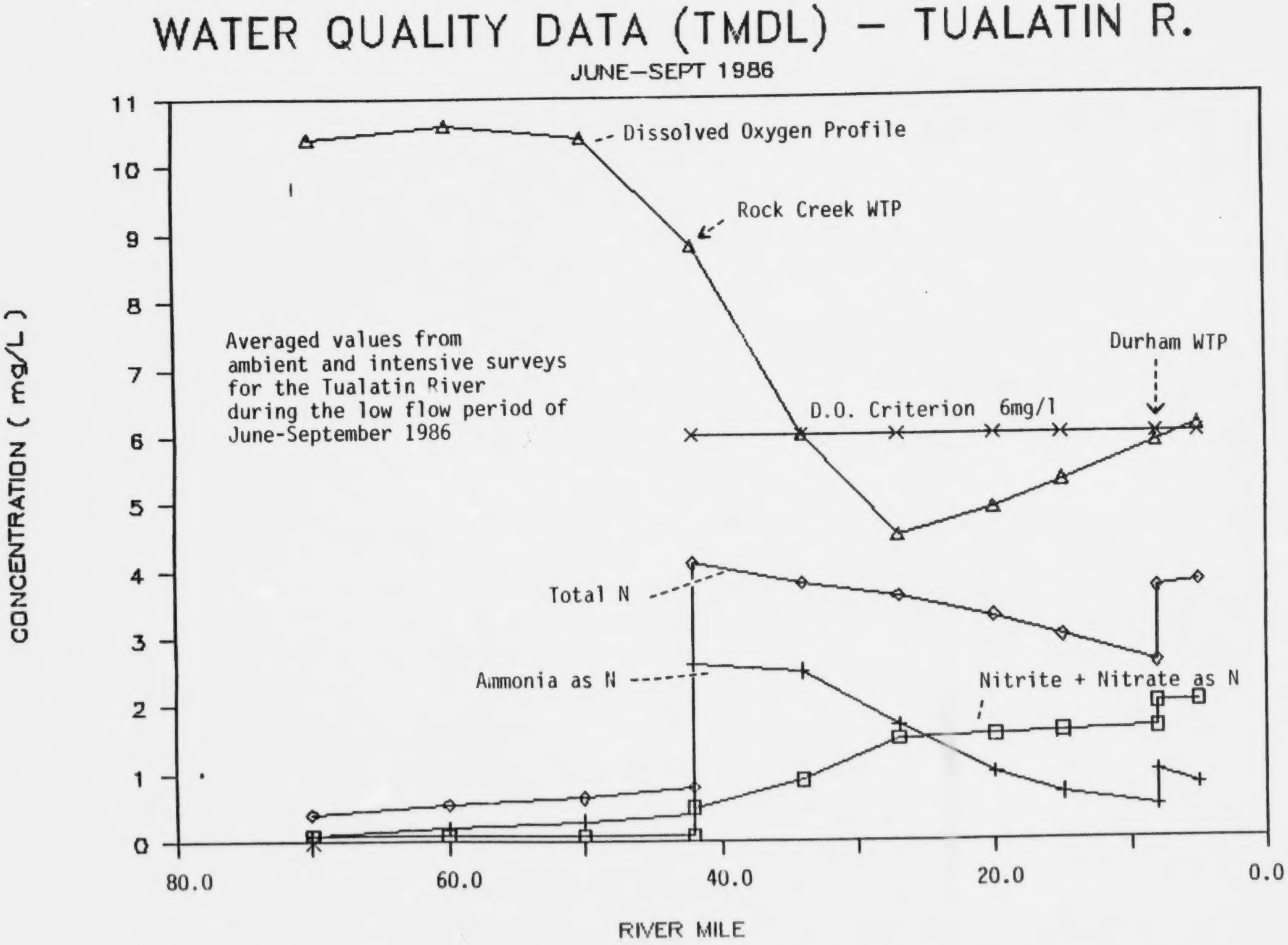


Figure 19. Dissolved oxygen and nutrient concentrations in the lower Tualatin River during June-September, 1986.

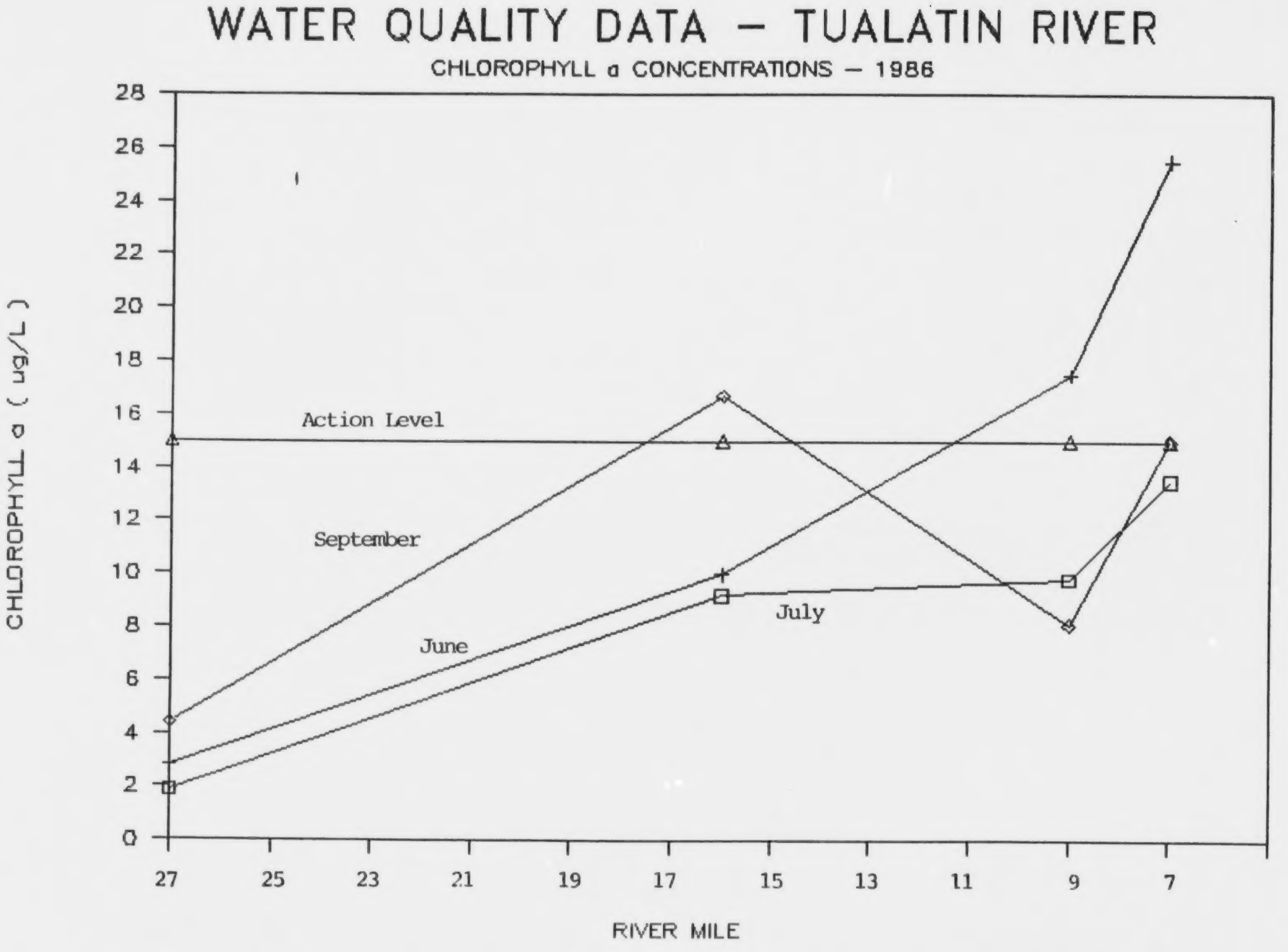


Figure 20. Chlorophyll a concentrations in the lower Tualatin River during July - September, 1986, relative to the action level specified in Oregon's Water Quality Standards.

Chehalis River Basin/ Grays Harbor Estuary

Recent studies have shown that juvenile coho salmon migrating to sea via the Chehalis River/Grays Harbor in Washington State only survive to adulthood at half the rate as juvenile coho salmon from other coastal rivers. The loss to the commercial and recreational fishery is estimated at one million dollars per year. Although not quantified, the impacts to the chinook salmon and steelhead trout fisheries are believed to be greater. This resource loss represents one of the major environmental problems faced by Region 10.

If the problem is found to be toxics-related, as is suspected, these studies may have enormous implications for both state and EPA toxics control programs. Smolting salmon are typically much more sensitive to toxics than are other organisms (including rainbow trout) routinely used in biomonitoring tests. Initial priority pollutant scans in Grays Harbor, however, have not detected any criteria violations. It is thus possible that EPA may be faced with the need to control toxics in effluents much more stringently than previously thought necessary.

While point source dischargers to the lower river and harbor (primarily pulp mills and municipal treatment facilities) have been accused of causing the problem, the actual cause is unknown at this time. Other factors potentially causing or contributing to the reduced survival are nonpoint source activities (agriculture, forest practices, urban runoff, landfills) and potential Superfund sites.

Local, state, and federal agencies have joined together with industry, tribal groups, and others to identify the cause for the poor salmon survival. An initial pilot study of the nature of the problem has already begun. Funding and in-kind support provided to date exceed $100,000. Legislative interest is also high, resulting in a recent appropriation of $400,000 to the Washington Department of Fisheries to fund a comprehensive study to determine why fish from the Chehalis River basin suffer the reduced survival. Additional funding aimed at identifying and characterizing point and nonpoint pollution sources, conducting bioassays using smolting salmon, and characterizing ambient water quality, will be conducted to identify any necessary regulatory controls.

The initial information which documented the salmon survival problem was based upon the rates at which fish from the Chehalis River basin and an adjacent, undeveloped river basin (the Humptulips River basin) are caught in the ocean fishery. This was determined by tagging outmigrating smolts from both river basins, and later recovering tags from the ocean fishery catch. The Humptulips River, which flows into the outer, unpolluted portion of Grays Harbor, provides a suitable control site. If the mortality problem in Chehalis River coho salmon is due to anthropogenic effects, the rate at which fish are caught in the ocean fishery will be a valuable environmental indicator of relative survival, and will be useful in tracking positive effects of any future management actions to control pollution sources (Figures 21-22). The management goal for this indicator would be to produce comparable survival rates in fish emanating from the two basins, unless the reduced survival is found to result from natural or uncontrollable conditions.

The pilot studies conducted during 1987 indicated that Na-ATPase levels in fish migrating downstream from the Chehalis River become depressed upon reaching inner Grays Harbor (Figures 23-24). Normally, Na-ATPase levels increase as juveniles prepare to migrate downstream, and continue to rise as the smolts migrate into and through estuaries. Fish migrating down the Humptulips River show this typical pattern. Fish migrating down the Chehalis River, however, show a significant depression in Na-ATPase when they reach the head of the estuary (at Cow Point/Rennie Island). Levels then begin to rise again as the fish continue to move farther out into the estuary. Na-ATPase levels are known to be sensitive to certain pollutants, such as chlorinated phenols and copper, which are present in Grays Harbor. Lowered Na-ATPase levels would be expected to reduce the ability of smolts to adjust to seawater. Physiological effects associated with lowered levels include decreased liver function, increased red blood cell fragility, increased reticulocyte counts, and decreased energy levels. Na-ATPase levels may thus be a sensitive indicator of pollution control efforts.

The major concern with the use of this indicator is that there is not presently an established relationship between Na-ATPase levels and decreased survival of smolts. Hopefully, this relationship will be more closely established (or refuted) during the two-year study.

Smolt production in the Chehalis River basin should also be a valuable indicator of the effectiveness of environmental control programs. This information is available for the upper basin (above the Black River) for four years (Table 7). This indicator will not be affected by any pollution controls affecting the lower Chehalis River and Grays Harbor. However, it will reflect any changes in the production capabilities of the upper watershed. Estimates of coho salmon escapement to the basin are also included as they help explain variation in smolt production (Table 8). The management goal for smolt production in the upper Chehalis River basin should be to reach the estimated production potential of 1,000,000 smolts.

Table 7

Coho salmon smolt production in the upper Chehalis River basin (upstream of the Black River). Estimated production potential is 1,000,000 smolts.

	Year 1976	1977	1986	1987
Smolt Production	116,000	47,000	700,000	*400,000

**Due to the low escapement of fish in 1985, and thus a low production of eggs, 3,000,000 coho fry were planted in the upper Chehalis basin.*

Table 8

Estimates of recent coho salmon escapement to the Chehalis River basin.

	Year 1984	1985	1986
Escapement	110,000	10,000	6,000-35,000

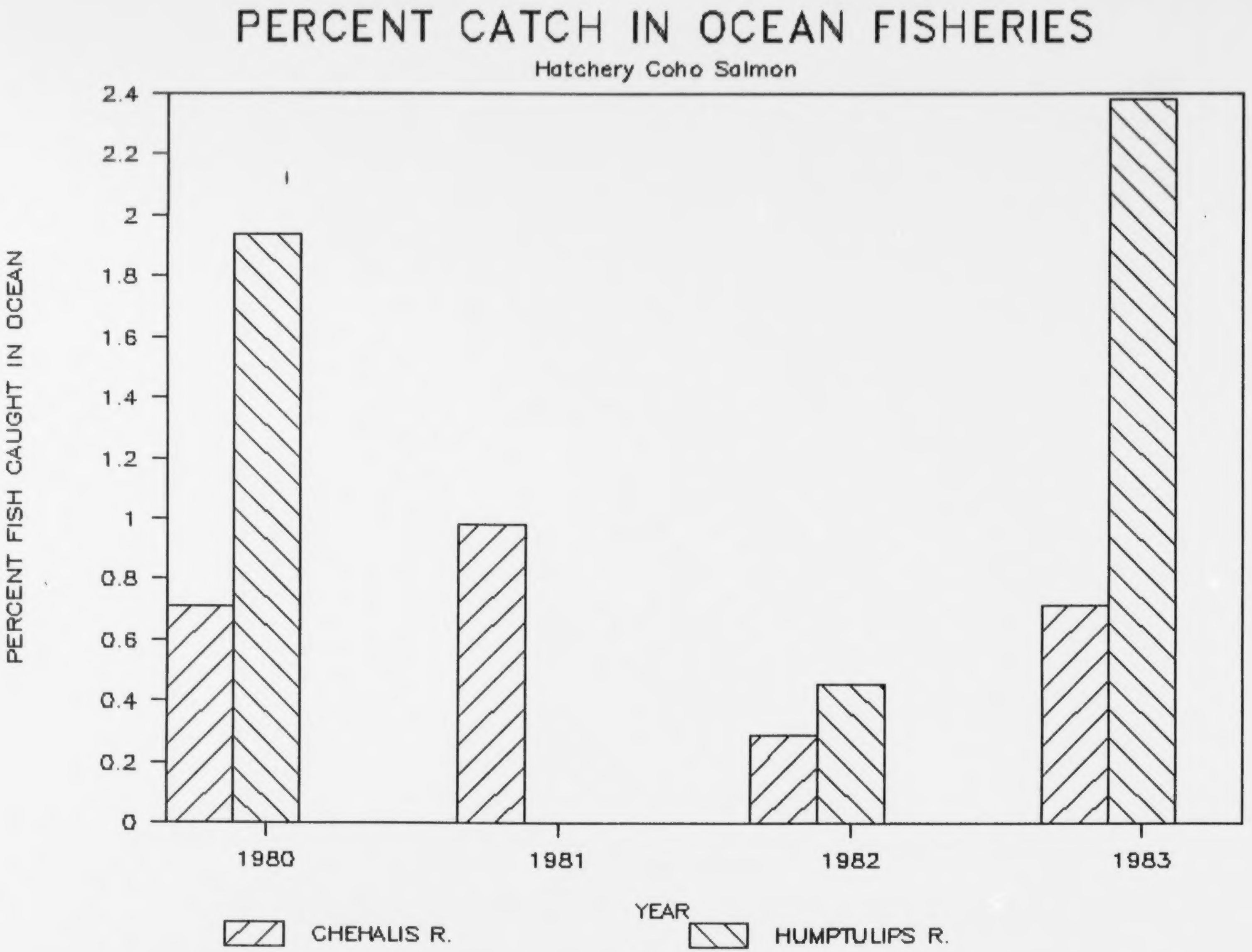


Figure 21. Relative survival of hatchery coho salmon from the Chehalis and Humptulips Rivers, 1980-1983, as indicated by the percentage of tagged fish caught in the ocean fishery.

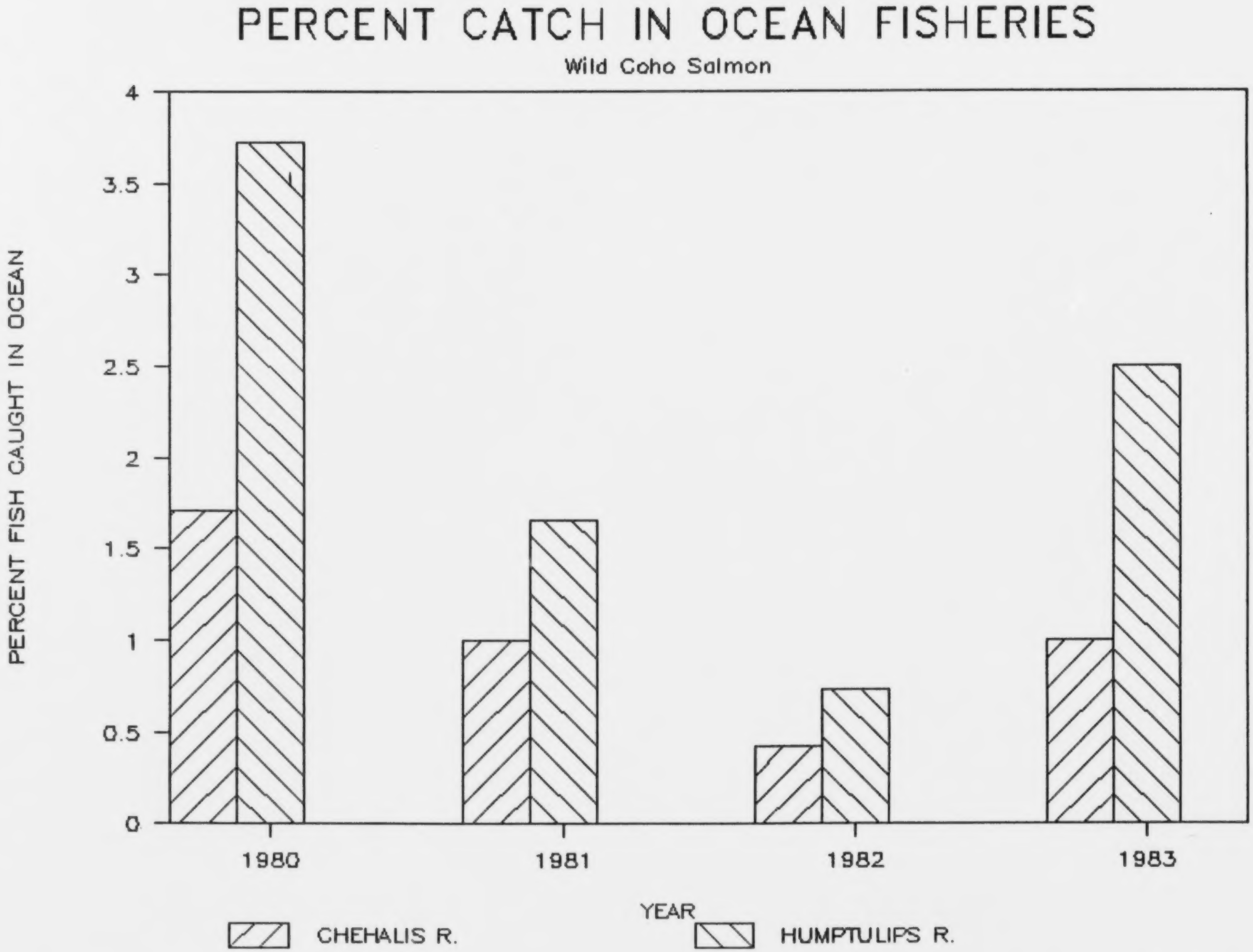


Figure 22. Relative survival of wild coho salmon from the Chehalis and Humptulips Rivers, 1980-1983, as indicated by the percentage of tagged fish caught in the ocean fishery.

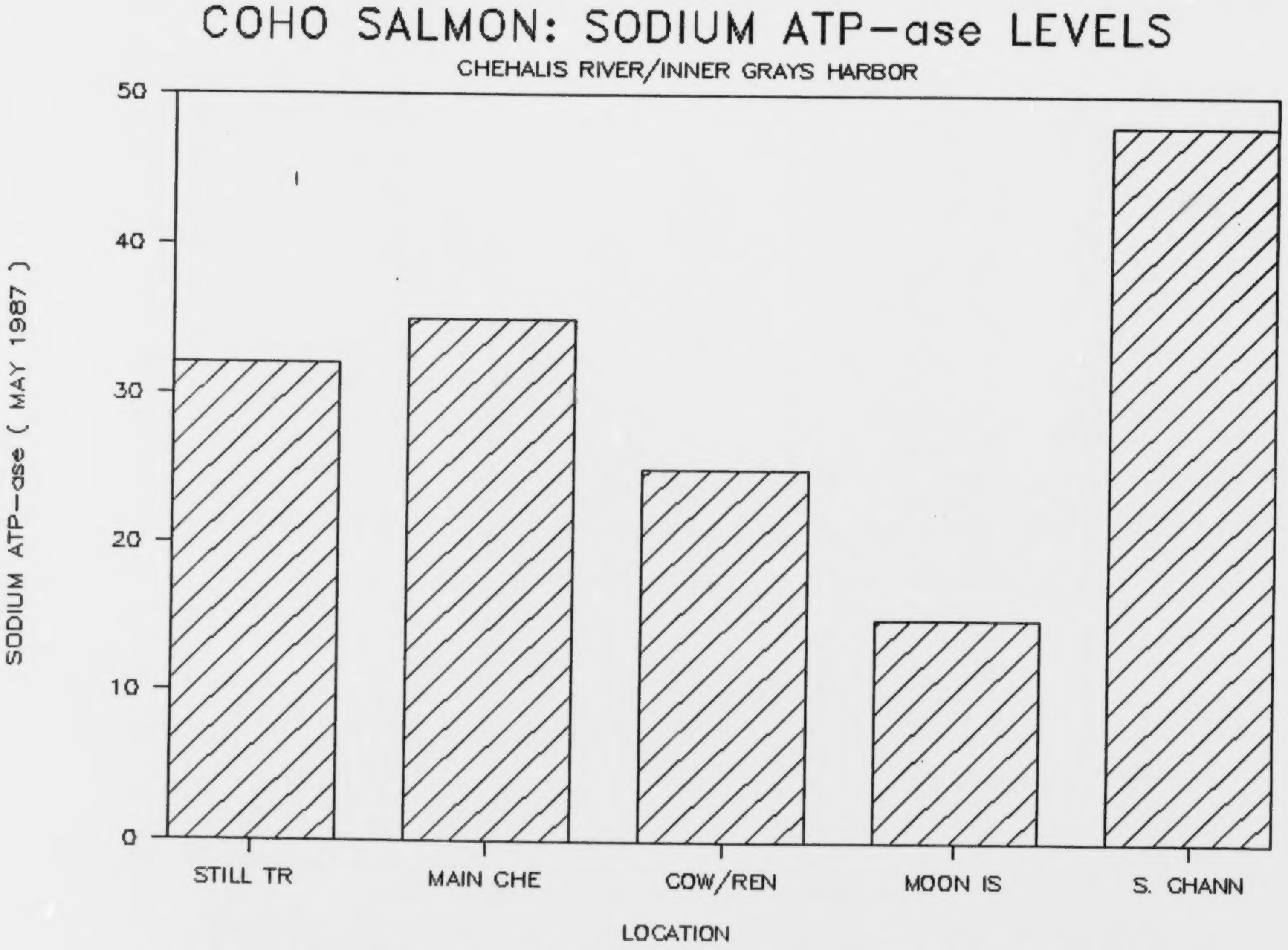


Figure 23. Sodium ATP-ase levels in Coho salmon migrating from the Chehalis River Basin through inner Grays Harbor, May 1987. Stations sampled were : Still Tr = Stillman Creek, Main Che = mainstream Chehalis River at RM. 35, Cow/Ren = Cow Point/Rennie Island, Moon Island, and S. Chann = South Channel.

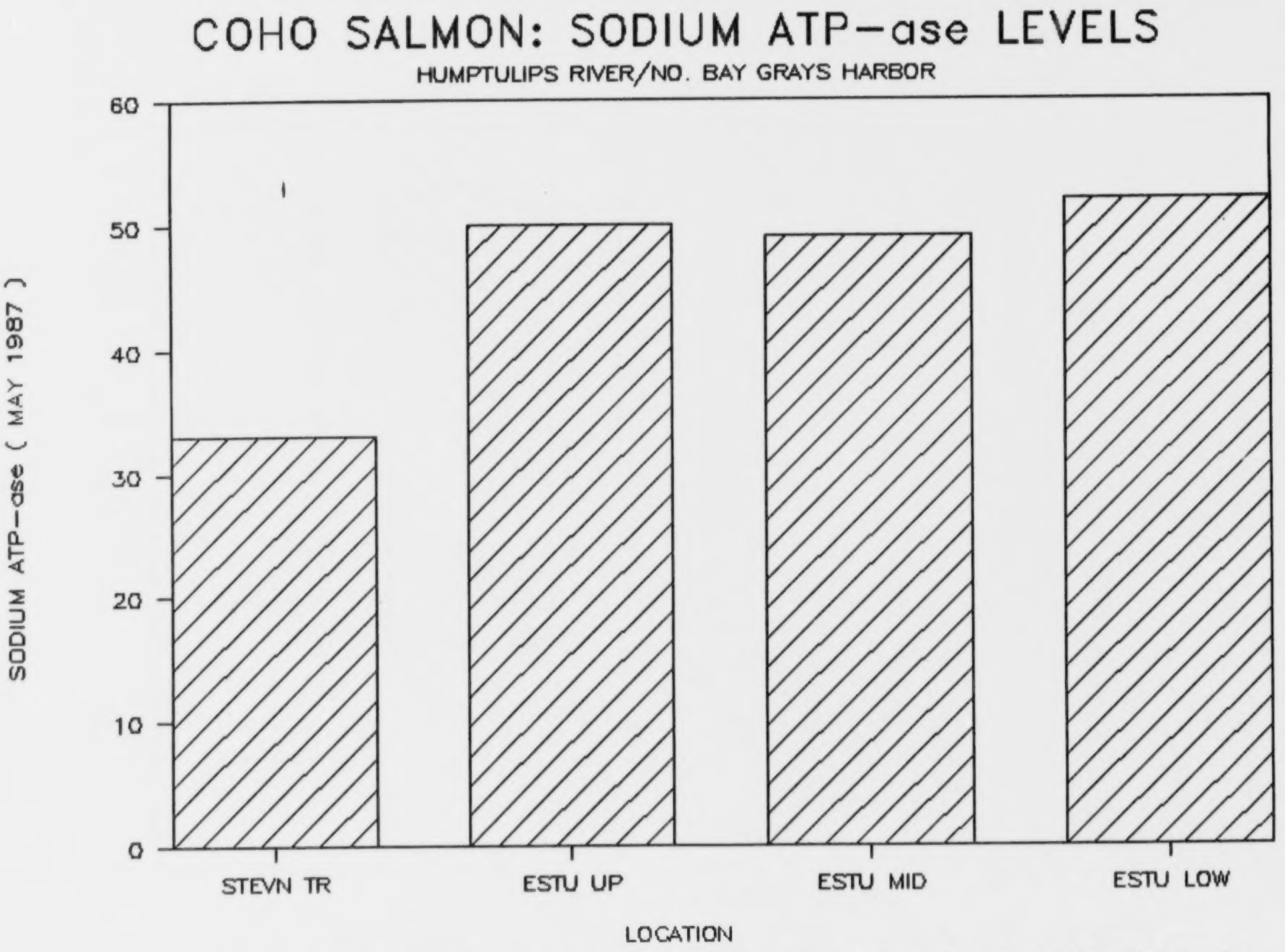


Figure 24. Sodium ATP-ase levels in coho salmon migrating from the Humptulips River basin through North Bay of Grays Harbor, May 1987. Station locations were at Stevens Creek, and in the upper, middle, and lower portions of North Bay.

Surface Water Environmental Indicators FY '88 and Beyond

There appeared to be general agreement that the surface water environmental indicators presented to Dick Bauer by the Office of Water Planning for FY 87 were appropriate and would provide useful information on the status of water quality in the region. Specific indicators suggested for inclusion in future annual summaries were

(1) The percentage of permits issued containing biomonitoring requirements; and

(2) The loadings of pollutants to WQL segments broken down into point and nonpoint source components.

In addition, it was requested that

(3) Stream maps showing the trend of water quality (as improving, degrading, or maintaining status quo) be developed; and

(4) That the desired management goal for each indicator be identified.

Item number 4 was done, with the goals incorporated into the FY 87 annual report. Also discussed throughout the FY 87 report are future actions on environmental indicators by the Office of Water Planning. Most of the significant actions are summarized below as commitments for FY 88.

a. Submit 305(b) guidance to states.
b. Manage contractor effort to identify environmental indicators for NPS.
c. Produce monitoring plans for national forests.
d. Develop near coastal water strategy for Oregon.
e. Pilot projects in two watersheds to identify management goals, limiting factors, needed management actions, and environmental indicators.
f. Evaluate adequacy of newly submitted 305(b) reports and describe needed improvements.
g. Prepare status reports listing WQL segments and pollutants of concern, and status of permits discharging to WQL segments.
h. Pilot project for aerial lakeshore analysis in northern Idaho.

APPENDIX 1

NPDES PERMIT CHECKLIST

NPDES # ____________________ Facility Name ________________________________

Receiving Water ________________ Flow Limits: __________ Average
Waterbody Segment No. ________________ __________ Max
_____Major _____Minor

I. Is biomonitoring required as a permit condition?
_____ YES _____ NO

If so, check species used:

_____ Rainbow trout
_____ Selanastrum
_____ Others(s) (please specify: ________________________________)
_____ Ceriodaphnia
_____ Oyster larvae
_____ Fathead minnow
_____ Echinoderm larvae

Bioassay type: _____ acute _____chronic Length of test: __________

Target effect: _____ Lethality _______ Other (Please specify:__________)

Does the permit contain effluent toxicity limits?
_____ YES _____ NO

If yes, what are the limits? (e.g. 80% survival at 65% effluent) ________
____
____

II. Is this permit contain water quality based limits?
_____ YES _____NO

If yes, for which parameters?

_____ Ammonia
_____ Zn
_____ Other(s) (please specify: ________________________________)
_____ Chlorine
_____ pH
_____ Cu
_____ DO
_____ As
_____ Temperature

III. Please indicate which (if any) toxic pollutants are limited (include ammonia and chlorine):

	New Permit Limits		Old Permit Limits	
Pollutant	Concentration	Total Loading	Concentration	Total Loading

IV. Was adequate ambient monitoring information available to determine permit limits?

_____ YES _____ NO

If not, what additional information is needed?____________________________
____
____

Will the permittee be required to collect ambient data?

_____ YES _____ NO

If so, what? ____
____
____

APPENDIX 2

16010102 BEAR RIVER (ABOVE WARDBORO)

SEGMENT #	STREAM SEGMENT	LOWER BOUNDARY	UPPER BOUNDARY	RESIDENT FISH	WILDLIFE	CULTURAL	NATURAL FEATURES	RECREATION
273.00	BEAR R	WARDBORO	WYOMING LINE	3	1	3	1	4
274.00	THOMAS FORK CR	BEAR R	WYOMING LINE	3	1	U	U	U
275.00	PREUSS CR	THOMAS FK	HEADWATERS	1	2	U	U	U
276.00	DRY CR	THOMAS FK	HEADWATERS	1	2	U	U	U
277.00	GIRAFFE CR	THOMAS FK	HEADWATERS	1	2	U	U	U

16010201 BEAR RIVER (ALEXANDER RES. TO WARDBORO)

SEGMENT #	STREAM SEGMENT	LOWER BOUNDARY	UPPER BOUNDARY	RESIDENT FISH	WILDLIFE	CULTURAL	NATURAL FEATURES	RECREATION
252.00	ALEXANDER RES			3	1	U	3	U
253.00	BEAR R	ALEXANDER RES	WARDBORO	3	1	3	1	4
254.00	SODA CR	BEAR R	HEADWATERS	4	1	U	1	U
255.00	BAILEY CR	BEAR R	HEADWATERS	2	2	U	U	U
256.00	EIGHTMILE CR	BEAR R	HEADWATERS	2	1	4	U	U
257.00	PEARL CR	BEAR R	HEADWATERS	2	2	U	U	U
258.00	STAUFFER CR	BEAR R	HEADWATERS	U	3	U	U	U
259.00	COOP CR	STAUFFER CR	HEADWATERS	2	3	4	U	U
260.00	GEORGETOWN CR	BEAR R	HEADWATERS	2	1	4	1	U
261.00	OVID CR	BEAR R	HEADWATERS	2	1	U	U	U
262.00	MONTPELIER CR	BEAR R	MONTPELIER RES	2	1	U	1	U
263.00	MONTPELIER RES			2	1	U	U	U
264.00	MONTPELIER CR	MONTPELIER RES	HEADWATERS	1	1	U	3	U
265.00	SNOWSLIDE CR	MONTPELIER CR	HEADWATERS	1	1	U	U	U
266.00	PARIS CR	BEAR R	HEADWATERS	3	2	U	3	U
267.00	BLOOMINGTON CR	REFUGE	HEADWATERS	1	2	U	1	U
268.00	ST CHARLES CR	REFUGE	HEADWATERS	1	1	U	1	U
269.00	LITTLE CR	BEAR LK	ST CHARLES CR	1	4	U	U	U
270.00	FISH HAVEN CR	BEAR LK	HEADWATERS	1	1	U	U	U

16010202 BEAR RIVER (UT LINE TO ALEX.RESERV.)

SEGMENT #	STREAM SEGMENT	LOWER BOUNDARY	UPPER BOUNDARY	RESIDENT FISH	WILDLIFE	CULTURAL	NATURAL FEATURES	RECREATION
230.00	THOMAS CR	BEAR R	WYOMING LINE	U	1	0	U	U
231.00	BEAR R	UTAH LINE	HIGHWAY 91	3	3	U	1	4
231.01	LAMONT RES			1	4	U	U	U
231.02	JOHNSON RES			1	4	U	U	U
231.03	FOSTER RES			1	4	U	U	U
231.04	GLENDALE RES			1	4	U	U	U
232.00	BEAR R	HIGHWAY 91	MINK CR	2	1	U	2	2
233.00	BEAR R	MINK CR	ONEIDA DAM	2	1	U	1	2
234.00	ONEIDA NARROWS RES			1	1	U	3	U
235.00	BEAR R	ONEIDA RES	COVE POWER PLANT	3	1	U	3	4
236.00	BEAR R	COVE POWER PLANT	ALEXANDER DAM	1	1	U	2	2

Puget Sound Estuary Program
Environmental Indicator Monitoring Strategy

Environmental Quality: Problem Statement

The quality of Puget Sound is a gauge of our success in environmental protection. Programs to control and prevent water pollution, protect marine fish and shellfish, and minimize risks to public health have long been in place in the region. As a result, substantial progress has been made toward controlling the discharges of many conventional pollutants, and much of the estuary remains relatively healthy and capable of supporting a broad range of beneficial uses. However, continuing urban growth and development are imposing ever-increasing demands upon the Sound. There is growing evidence that serious water quality problems remain.

Chemical Contamination: During the past few years, high concentrations of priority pollutants and other potentially harmful chemicals have been identified in the sediments of a number of urban/industrial bays in Puget Sound. Relatively little is known about the ways in which exposure to specific chemicals affect marine life, however, recent surveys have found increased frequencies of tumors and other abnormalities in bottom-dwelling fish and invertebrates. Data also indicates that significant levels of known carcinogens are accumulating in the tissue of marine birds and mammals. It is unclear to what extent humans are at risk in consuming seafoods harvested from Puget Sound.

Bacterial Contamination: In recent years, the ability to grow and harvest shellfish in Puget Sound has also been increasingly affected by water quality problems. Although recreational harvesting is still allowed, the entire eastern shore of the estuary has been classified as uncertifiable for commercial shellfish harvesting due to high levels of fecal coliform bacteria in the water. The coliform bacteria are generally harmless, however, they indicate the potential presence of viruses and other harmful pathogens.

Habitat Loss and Degradation: The loss and degradation of valuable habitat, including wetlands and fish nursery areas, has occurred over the past several decades in the Puget Sound region at an alarming rate. The full impact of this loss on the biological productivity and the stability of the estuary is not known, although experiences in other parts of the nation indicate that impacts may be substantial.

Background: The Puget Sound Estuary Program

As mandated in the Clean Water Act, the primary function of the Puget Sound Estuary Program (PSEP) is to characterize past and current environmental conditions, facilitate development of a comprehensive management strategy to address current pollution related problems, and facilitate development of a long term, Sound-wide monitoring program. In response to this mandate, PSEP has sponsored a wide range of studies since 1985. The results of these studies have added to our ability to characterize current environmental conditions, and to understand the nature, extent, and significance of pollution impacts on estuarine resources. In addition, they provided the basis for a variety of the recommendations contained in the Puget Sound Water Quality Authority's (PSWQA) 1986 State of the Sound Report and the PSWQA 1987 Comprehensive Management Plan.

Although additional studies to characterize past and present conditions will continue, increased emphasis is now being placed on the development of a program that can be used to monitor future changes in environmental quality and to track the effectiveness of pollution control efforts. The following pages outline strategies by which environmental conditions in the Sound can be monitored. Both a preferred and an alternative strategy are presented (environmental indicators, and proposed FY 88 commitments are identified for each).

It will not be known until the fall of 1988 whether funds will enable implementation of the preferred strategy, or whether implementation of the alternative program will be required. The preferred strategy proposes comprehensive monitoring of a wide range of environmental indicators. This strategy is currently being developed by PSWQA and the Puget Sound Estuary Program, for implementation by the State. The alternative approach, on the other hand, proposes monitoring of only a limited number of environmental parameters. Monitoring of "key environmental indicators" would be the responsibility of the Office of Puget Sound; monitoring of "supplementary indicators" would be the responsibility of other agencies or offices within EPA. Although reduced in scope, the alternative strategy will enable the agency to track long-term changes in environmental quality, and the effectiveness of regulatory and management programs.

Preferred Environmental Monitoring Strategy

In March 1988, PSEP and PSWQA will complete the design of a comprehensive monitoring program for Puget Sound. Currently in draft form, the program proposes routine monitoring of a wide variety of physical, chemical, and biological variables. The plan, which will build on and augment existing programs at the federal, state, and local level, will utilize standard protocols developed by PSEP. Because it now appears unlikely that available funds will enable annual monitoring of all proposed indicators, it is anticipated that the final monitoring plan will recommend phased implementation and periodic, rather than annual, monitoring of certain variables. Periodic monitoring of certain parameters is acceptable because changes will not be detectable in a short period of time, even if all sources of chemical pollution are eliminated.

Summary of Proposed Ambient Monitoring Parameters

Sediment Monitoring
- Sediment Chemistry *
- Bioassays *
- Benthic Community Analysis *

Water Column Monitoring
- Temperature
- Salinity
- Dissolved Oxygen *
- Turbidity *
- Nutrients *
- Chlorophyll *
- Pathogen Indicators *
- Odors, Floatables, Spills

Biological Monitoring
- Fish Abundance *
- Toxics Chemicals in Fish *
- Fish Disease *
- Shellfish Abundance *
- Toxics in Shellfish
- Paralytic Shellfish Poisoning
- Bacteria in Shellfish *
- Marine Mammals
- Birds

River and Stream Monitoring
- River Mouth Sediments
- River Mouth Water Column Parameters
- River and Streams Programs

Habitat Monitoring *

Ancillary Data

---

* *Environmental Indicators*

Alternative Environmental Monitoring Strategy

If sufficient funds are not available to support a minimally acceptable state sponsored program, PSEP proposes implementation of an alternative monitoring strategy beginning in spring FY89. The proposed alternative program includes a reduced number of environmental indicators and will provide only limited geographic coverage, however, it should enable the Agency to determine whether management and regulatory programs are addressing priority environmental problems. Both "key" and "supplemental" environmental indicators are identified. Key indicators primarily address problems associated with chemical contamination. It is proposed that monitoring of key indicators be the responsibility of the Puget Sound Estuary Program and ESD. Supplemental environmental indicators address additional chemical concerns, bacterial contamination, and habitat degradation. The Office of Puget Sound cannot guarantee the routine availability of data pertaining to supplemental indicators. Therefore, other responsible agencies or offices within EPA are identified.

I. ***Key Monitoring Parameters/Environmental Indicators***

1. **Sediment Chemistry**: provides an indirect measure of changes in contaminant loading over time and foresight regarding sediment toxicity.

2. **Sediment Bioassay**: laboratory measure of acute toxicity to benthic organisms.

3. **Benthic Community Structure**: empirical measure of chronic effects, provides additional protection against impacts unaccounted for by single species bioassay or limited chemical analysis.

It is recommended that five sites be monitored at each of two urban/industrial bays in Puget Sound (with a limited number of samples collected in "clean" reference areas. Elliot Bay and Everett Harbor are recommended as logical urban sites because they represent locations of aggressive pollution control programs currently being implemented by EPA and other agencies.

It is proposed that all samples be collected by Region 10's Environmental Services Division. Sediment and fish tissue analyses, and amphipod bioassays could be conducted at the EPA laboratory at Manchester. Benthic community evaluation and sediment conventional analyses would have to be conducted at either the EPA laboratory in Newport, or at a contract lab facility.

The following activities would supplement the environmental indicator data collected by PSEP and ESD under the alternative monitoring strategy. All of these activities, with the exception of #1 (comprehensive point source monitoring), are already being conducted on a sufficient scale by federal, state, or local agencies.

1. **Point Source Monitoring**: EPA, Permits and Compliance Branch; it is recommended that EPA and the Dept. of Ecology make chemical loading reporting, and effluent and ambient biomonitoring, requirements of all revised and newly issued NPDES permits.

2. **Habitat/Wetlands Monitoring**: EPA, Environmental Evaluation Branch; it is recommended that EEB monitor wetland mitigation success, and cumulative changes in the quality and quantity of wetland habitat areas.

3. **Water Column Monitoring**: Metro will continue routine monitoring of bacteria and water quality parameters at two stations in the central Sound.

4. **Bioaccumulation Monitoring**: NOAA, Mussell Watch Program, will continue annual monitoring of four stations.

5. **Fish Disease Monitoring**: NOAA, Benthic Surveillance Program, will continue annual monitoring of four stations.

6. **Shellfish Monitoring**: Department of Social and Health Services, will continue to conduct surveys of commercial and recreational shellfish harvesting beaches for both chemical and bacterial contamination.

Puget Sound Environmental Indicators FY 88 and Beyond

1. ***Sediment Indicators***
   - Sediment Chemistry
   - Sediment Bioassays
   - Benthic Community Analyses

2. ***Water Column Indicators***
   - Dissolved Oxygen
   - Turbidity
   - Nutrients
   - Chlorophyll
   - Pathogen Indicators

3. ***Biological Indicators***
   - Fish Abundance
   - Chemicals in Fish Tissue
   - Fish Disease
   - Shellfish Abundance
   - Chemicals in Shellfish Tissue
   - Bacteria in Shellfish

4. ***Habitat Indicators***
   - Wetland/Habitat Quality and Quantity
   - Wetland Mitigation Success

5. ***Short-Term Toxics Control Indicators***
   - Effluent and Near-source Ambient Biomonitoring
   - NPDES Contaminant Loading

FY 88 Commitments for Environmental Indicators Initiative Office of Puget Sound

It is anticipated that actual full-scale implementation of the preferred monitoring program will not begin until the spring of 1989. However, in 1988, a variety of preliminary events will occur. It is proposed that items two through four, below, be entered into the Regional Accountability System as means of tracking PSEP progress in FY88.

1. Participating State and local agencies will develop detailed workplans to fulfill monitoring program assignments. If funds are available, the agencies will conduct preliminary baseline field surveys beginning in the summer of 1988.
2. PSEP will conduct a comparison of bioassays to evaluate the relative sensitivities of test organisms and to identify the most appropriate bioassay for long-term monitoring.
3. PSEP and PSWQA will design a database system to provide the State with monitoring program analytical, reporting, and data management capabilities.
4. PSEP and PSWQA will initiate a scoping study to examine methods of linking the monitoring program data management system and the Puget Sound Environmental Atlas database, so that monitoring information can be used to provide future updates to the Atlas and the State of the Sound Report.
5. PSWQA and PSEP will produce and issue an updated State of the Sound Report.

Although not an identified component of the Comprehensive Monitoring Program, both the Puget Sound Water Quality Authority and Puget Sound Estuary Program strongly recommended that EPA and the Dept. of Ecology make chemical loading reporting and effluent and ambient biomonitoring requirements of all revised and newly issued NPDES permits. Monitoring near point sources will provide short-term measures of changes in environmental quality and the effectiveness of regulatory controls.

It is not proposed that RAS commitments addressing the alternative monitoring strategy be incorporated for tracking FY 88. Implementation of the alternative program will be necessary only if funds are unavailable to support the preferred program. If it is determined in the summer/fall of 1988 that alternative monitoring is required, monitoring will begin in the spring of 1989 (the Puget Sound Protocols require that benthic invertebrates be samples during the early spring).

Chapter 3: Construction Grants

In FY 87, the Construction Grants program agreed to develop a proposed environmental indicator for future use. Their FY 87 report, then, describes this proposal. The FY 88 indicator will be the proposed FY 87 measure, and will include any successful enhancements which the program agreed to attempt for FY 88.

FY 87 Proposed Environmental Indicator:

Biochemical oxygen demand (BOD) and suspended solids improvements at completed construction grants projects initiating operation during FY88

Environmental Indicator for FY 88 and Beyond:

Same as above, but the program will look into expanding the measure to address the following areas:

1) pushing the baseline back in time;
2) adding a measure of the results achieved by operation and maintenance efforts;
3) estimating decreases in residual chlorine;
4) adding a measure of toxics eliminated, and
5) reviewing potential candidates for before and after monitoring.

A Proposed Environmental Indicator For The Construction Grants Program Using the Needs Survey Data Base

The Needs Survey was mandated by Congress in the Clean Water Act. Conducted every two years, this survey requires states to collect data on all planned and operating wastewater treatment systems. Because it has been used as the basis for allocating appropriated funds among the states, the emphasis of the survey has been on documenting funds needed for proposed construction. The survey also includes data on current and projected flows, populations, treatment methods and permit limits. (See Attachment I for a list of technical data contained in the Needs Survey.) One of the goals of the 1988 Survey, which the states are preparing for now, is to improve the quality of this technical data, which has not been emphasized in past surveys.

Headquarters has also been working to improve access to this data through development of an in-house software system. We now have on-line access to the 1984 or 1986 survey record for any Region 10 facility. In the future, we are supposed to have the ability to create reports and to link the survey data with the data on federal grant awards contained in the Grants Information System (GICS). By comparing the data in GICS to the actual and projected data contained in the needs survey, we should be able to calculate theoretical improvements resulting from the completion of construction grants projects.

The Needs Survey data will not provide a true measure of environmental benefit, but will provide an indicator of potential environmental benefit. It is the closest we can come with the data available to us. There is no requirement for grantees to do before and after monitoring, ambient monitoring stations are often not close enough to the plant to pick up changes, and the contribution of a municipal wastewater plant is often masked by other discharges or non-point sources.

Our intention was to develop measures of estimated changes in quantities of pollutants released to the environment. Our proposed measure for treatment plants is estimated pounds of BOD or suspended solids removed by new or improved treatment works. The environmental benefits of interceptors, collectors, infiltration/inflow correction, sewer rehabilitation and sludge projects cannot be estimated as easily since these do not have a single discharge. We do not recommend developing separate measures for them. These areas are discussed briefly at the end of this paper.

New Plants and Improvements: New plants and improvements to existing plants account for over 70% of construction grant funded projects. Our proposed indicator for these projects is discussed generally below. Sample calculations, accounting for both new and improved plants, follow.

The first step in our analysis was to review the quality of the technical data currently contained in the Needs Survey. Data in the survey for flows and pollutant loadings were compared to the permit and daily monitoring report (DMR) data contained in the Permits Compliance System (PCS) for major discharges. In most cases, the current and future flow limitations and limits for BOD and suspended solids specified by the permit were accurately reflected in the Needs Survey database. Information on actual current pollutant levels and flows, which is naturally more variable, did not correspond as well to the DMR data contained in PCS. In many cases the data were missing from the Needs Survey. Therefore, it will not be possible to use actual loadings in our calculations. Instead, we will depend entirely on the usual permit limits for primary and secondary treatment, realizing that some plants will get better treatment than required after improvements, and that the pre-construction plants may have gotten either better or worse treatment than required, depending on the circumstances.

For upgrades we compare pre-construction limits (usually primary) to post-construction limits (secondary or advanced treatment) for BOD and suspended solids, multiplying the difference by the plant design capacity.

For expansions, we decided to account for the treatment gained in the septic tanks being replaced. That is, we presume that the new flows in excess of the pre-construction design capacity would have the approximate net effect of the difference between primary and secondary treatment. This is a very conservative estimate in that some of the replaced septic tanks are failing and some of the "future" septic tanks which need not be installed would no doubt have exceeded the absorption capacity of the area (building bans not accounted for, of course). We are, therefore, calculating the BOD and suspended solids removals in terms of going from primary to secondary or advanced treatment, and multiplying these figures by the increase in flow capacity.

For projects which provide both upgrade and expansion, the theoretical pollutant removals will be the sum of the two calculations above.

Similar to the calculations for expansions, for new plants we are calculating the difference from primary to treated strengths and multiplying by the new capacity of the plant.

Obviously, these are rough calculations. The changes in BOD and suspended solids are estimates of the amounts that, without construction, would have been discharged into the environment at some point, not necessarily at the plant or into a specific waterbody. There is no way to separate immediate from future benefits, since current flows can either fall above or below the pre-construction design capacities. Nor is there any way to separate the portion of the capacity we are funding from the reserve capacity funded locally, since the funded capacity is always higher than the existing flows (it includes capacity for existing population which has not yet been connected to the system).

Collectors and Interceptors

About 20% of construction grants funds go to collector and interceptor projects, often to transport waste flows from areas with failing septic tanks, which may pollute surface and ground waters and are often significant public health threats. While we could calculate a theoretical decrease in BOD or suspended solids levels attributable to these projects (as with plant expansions), we would be, in most cases, double-counting the pollution removals associated with plant expansions. We might instead be able to calculate the increased population receiving collection as a separate measure. Data for both the current and future situations would be taken from either the needs survey or the facility plan, depending on whether more than one grant was used to fund interceptors or collectors for a particular community.

Other Construction Grant Projects

The two measures discussed above account for about 90% of construction grant projects. Sludge projects, pump station projects, infiltration and inflow correction, sewer rehabilitation and combined sewer overflow correction projects account for the remaining funds. Because (1) they represent a small fraction of total construction funds, (2) they would require a separate data gathering effort, and (3) may not be summarized in a meaningful way, we have not developed separate measures to account for them.

Limitations on Use

The measure we have proposed is only an indicator of potential environmental benefit, based on discharge levels allowed by permit. Actual discharge levels will vary. And, in the environment, these improvements in treatment plant discharges may be masked by other discharges.

Our proposed measure is intended only for use as a regional indicator of potential environmental benefits. It is not intended as a commitment. Because the calculations are based on assumptions about levels of pollutants allowed by permit, rather than actual operational levels, the data is not meaningful if it is disaggregated. For any given plant, the levels we have assumed are likely to be incorrect, either too high or too low. But when taken together for a large group of plants, these differences tend to balance one another.

For this reason we propose that the data be reported just twice a year, at mid-year and year-end, for the region as a whole. We would include in our calculations all plants that have initiated operation during the year. If a project is segmented, we would count it only when the entire plant change is effected, that is that all needed segments are operational. Interceptors and collectors would also be tallied as they become operational, usually separately.

Future Improvements

Data quality should improve with the FY88 data collection effort. Headquarters is also working on a number of enhancements to the computerized database, which could allow us to conduct more refined analyses. If these enhancements are available, we will apply them to the year-end numbers.

Sample Calculations for New Plants and Improvements

Needs survey data and sample calculations for three hypothetical plants needing construction are shown below. Standard influent levels of 200 mg/l have been assumed for both BOD and suspended solids.

A. Survey data and a calculation for a project being upgraded from primary to secondary are shown here:

Permit/Design Limits

	BOD	**Suspended Solids**	**Flow**
Current	140 mg/l	100 mg/l	1.0 MGD
Planned	30 mg/l	30 mg/l	1.0 MGD

Avoided Discharge = Δ concentration, lbs./million lbs. x flow, lbs./day

Δ Concentration = current level - planned level.

Δ Concentration, BOD = 110 mg/l
= 110 lbs./million lbs. water

Δ Concentration, SS = 70 mg/l
= 70 lbs./million lbs. water

Flow, lbs./day = 1.0 million gal/day x 8.34 lbs./gal
= 8.34 million lbs./day

Avoided BOD = 110 lbs./million lbs. water x 8.34 million lbs./day
= 917 lbs./day BOD

Avoided SS = 70 lbs./million lbs. water x 8.34 million lbs./day
= 584 lbs./day Suspended solids

B. Data and a calculation for an expansion project (without change in treatment level) are shown below:

	BOD Limit	**SS Limit**	**Flow**
Current	30 mg/l	30 mg/l	1.8 MGD
Planned	30 mg/l	30 mg/l	3.2 MGD

The difference in flow between the planned and current levels, 1.4 MGD, is assumed to be currently receiving treatment equivalent to primary: 140 mg/l BOD and 100 mg/l suspended solids.

Avoided discharge = Δ concentration, lbs/million lbs x D flow, lbs/day

Δ concentration = primary permitted level-secondary permitted level
= 140 lbs. BOD/million lbs. water
= 100 lbs. SS/million lbs. water

Flow, lbs./day = 1.8 million gal/day x 8.34 lbs./gal
= 15.01 million lbs./day

Avoided discharge = 2,100 lbs/day BOD and 1,500 lbs/day suspended solids

C. Data and calculations for a project involving increases in both treatment level and capacity are as follows:

Permit/Design Limits

	BOD	**Suspended Solids**	**Flow**
Current	60	70	.26 MGD
Planned	30	30	.37 MGD

The difference between current and planned flows, .11 MGD, is assumed to be receiving equivalent to primary treatment: 140 mg/l BOD and 100 mg/l suspended solids.

Avoided Discharge = current flow x (current concentration-planned concentration) + Δ flow x (primary concentration-planned concentration)

Current Flow, lbs/day = .26 million gal/day x 8.34 lbs./gal
= 2.17 million lbs./day
Δ Flow, lbs/day = .11 million gal/day x 8.34 lbs./gal
= .92 million gal/day

Avoided BOD = 2.17 million lbs./day x 30 lbs./million lbs. water - .92 million gal/day x 110 lbs./million lbs. water
= 166 lbs. BOD

Avoided SS = 2.17 million lbs./day x 40 lbs./million lbs. water - .92 million lbs./day x 70 lbs./million lbs. water
= 151 lbs. suspended solids

NEEDS SURVEY DATA DICTIONARY (ALPHABETIC LISTING)

Element Name	Description
ABANDON	Date abandoned
AUTHNAM	Authority name
*CEXEFBO	Existing effluent BOD (mg/L)
*CEXEFNH	Existing NH3 effluent (mg/L)
*CEXEFP	Existing P effluent (mg/L)
*CEXEFSS	Existing effluent SS (mg/L)
*CFDEFBO	Future design effluent BOD (mg/L)
*CFDEFNH	Future design NH3 effluent (mg/L)
*CFDEFP	Future design P effluent (mg/L)
*CFDEFSS	Future design effluent SS (mg/L)
*CHGELE	Percent change in numeric value to 86 Survey
*CITYNAM	City name
*CNGDIST	Congressional district
*CNTYNAM	County name
*CNTYNUM	State plus county number
COLLPOP	1972 population requiring collection
COMMENT	Comment codes (four one-character codes)
COMPCOM	Compliance comment
COMPDAT	Compliance date
*COMPMM	Facility located on major or minor reach
COMPNON	Compliance status
*COMPSCR	Compliance status source
CONCEXE	Existing concentration, effluent (mg/L)
CONCEXI	Existing concentration, influent (mg/L)
CONCFUE	Future design concentration, effluent (mg/L)
CONCFUI	Future design concentration, influent (mg/L)
CONCLIN	Concentrations line number (4,5,..8,9,A,B)
CONCPRE	Present design concentration, effluent (mg/L)
CONCPRI	Present design concentration, influent (mg/L)
*CPDEFBO	Present design effluent BOD (mg/L)
*CPDEFNH	Present design NH3 effluent (mg/L)
*CPDEFP	Present design P effluent (mg/L)
*CPDEFSS	Present design effluent SS (mg/L)
CSOAREA	Combined sewer area (acres)
CSOPOP	Combined sewer area service population
*CSORTYP	CSO Receiving water type
*CSOURB	CSO Urbanized area number
*DELETED	Deleted facility flag
*DISCHRG	Discharges flow to (A/F #)
DISPCHG	Projected liquid effluent disposal change
*DISPDSP	Method of liquid effluent disposal

NEEDS SURVEY DATA DICTIONARY
(continued)

Element Name	Description
*DISPLIN	Disposal of liquid effluents line
*DISPUSE	Status of liquid effluent disposal
DOCAUTH	Documentation author
DOCCOM1-5	Documentation comments (5 lines)
DOCDATE	Date of source documentation
*DOCI	Documentation type, category I
Element	Description
*DOCII	Documentation type, category II
*DOCIIIA	Documentation type, category IIIA
*DOCIIIB	Documantation type, category IIIB
*DOCIVA	Documentation type, category IVA
*DOCIVB	Documentation type, category IVB
DOCTITL	Documentation title
*DOCV	Documentation type, category V
DUNBRAD	Dun & Bradstreet number
*EFFPRES	Present effluent level
*EFFPROJ	Projected effluent level
EFFREA1	Reasons why advanced treatment is necessary
ELENUM	Element number within group
F19TOT	1990 Total design flow (monthly average, mgd)
*FACCHNG	Type of facility change
*FACID	State/authority/facility number
*FACNAME	Facility name
*FACSTAT	Operational status of facility
*FEXDOM	Existing domestic percapita flow (gpcd)
*FEXIND	Existing industrial flow (mgd)
*FEXTOT	Existing total flow (mgd)
*FFDDOM	Future design domestic per capita flow (gpcd)
*FFDIND	Future design industrial flow (mgd)
*FFDTOT	Future design total flow (mgd)
*FPDDOM	Present design per capita flow (gpcd)
*FPDIND	Present design industrial flow (mgd)
*FPDTOT	Present design total flow (mgd)
GICS	GICS number associated with facility
GRPKEY	Multirecord groups key
HCHANG	Old value
HRCODE	Historic review code
*IICODE	Rehabilitation method for I/I
IIFLOW	Estimate of excess I/I flow
*NECELIG	EPA current eligible $ (sum CAT I,II,IIIA,IVB)
*NECI	EPA current year $ (CAT I)
*NECIAII	EPA current year trt $ (sum CAT I,II)
*NECII	EPA current year $ (CAT II)

NEEDS SURVEY DATA DICTIONARY
(continued)

Element Name	Description
*NECIIIA	EPA current year $ (CAT IIIA)
*NECIIIB	EPA current year $ (CAT IIIB)
*NECIVA	EPA current year $ (CAT IVA)
*NECIVB	EPA current year $ (CAT IVB)
*NECTEXV	EPA design year $ totals (All categ except V)
*NECTOT	EPA current year $ total (sum all categories)
*NECV	EPA current year $ (CAT V)
*NEDELIG	EPA current year $ (sum CAT I,II,IIIA,IVB)
*NEDI	EPA design year $ (CAT I)
*NEDIAII	EPA design year trt $ (sum CAT I,II)
*NEDII	EPA design year $ (CAT II)
*NEDIIIA	EPA design year $ (CAT IIIA)
*NEDIIIB	EPA design year $ (CAT IIIB)
*NEDIVA	EPA design year $ (CAT IVA)
*NEDIVB	EPA design year $ (CAT IVB)
*NEDTEXV	EPA design year $ totals (All CAT except V)
*NEDTOT	EPA design year $ total (sum all categories)
*NEDV	EPA design year $ (CAT V)
*NPDES	NPDES number of facility
NRSFUTR	Future non-resident pop (EPA-1 column)
NRSPRES	Present non-resident pop (EPA-1 column)
*NSCELIG	State current eligible $ (sum CAT I,II,IIIA,IVB)
*NSCI	State current year $ (CAT I)
*NSCIAII	State current year trt $ (sum CAT I, II)
*NSCII	State current year $ (CAT II)
*NSCIIIA	State current year $ (CAT IIIA)
*NSCIIIB	State current year $ (CAT IIIB)
*NSCIVA	State current year $ (CAT IVA)
*NSCIVB	State current year $ (CAT IVB)
*NSCTEXV	State current year $ total (All CAT except V)
*NSCTOT	State current year $ total (sum all categor)
*NSCV	State current year $ (CAT V)
*NSDELIG	State design year elig $ (sum CAT I,II,IIIA,IVB)
*NSDI	State design year $ (CAT I)
*NSDIAII	State design year trt $ (sum CAT I,II)
*NSDII	State design year $ (CAT II)
*NSDIIIA	State design year $ (CAT IIIA)
*NSDIIIB	State design year $ (CAT IIIB)
*NSDIVA	State design year $ (CAT IVA)
*NSDIVB	State design year $ (CAT IVB)
*NSDTEXV	State design year $ totals (All CAT except V)

NEEDS SURVEY DATA DICTIONARY
(continued)

Element Name	Description
*NSDTOT	State design year $ total (sum all categor)
*NSDV	State design year $ (CAT V)
NUMGRP	Group number
*PFNCANC	Future non-res pop expected to be sewered
*PFNTANT	Future non-res pop expected to RCV treatment
*PFRCANC	Future res pop expected to be sewered
*PFRNC	Future res pop not expected to be sewered
*PFRNT	Future res pop not expected to RCV treatment
*PFRRC	Future res pop expected to be sewered
*PFRRT	Future res pop expected to RCV treatment
*PFRTANT	Future res service pop (sum RCV + NOT RCV trt
*PHYSCST	Cost estimate for proposed sewers
PHYSDIA	Diameter of pipe (inches)
PHYSLEN	Length(ft)/capacity(mgd) of pipe
PHYSTYP	Type of pipe (CS,IS,PS,FM, etc)
PHYSLIN	Physical/Cost dat for sewers (EPA-1 form)
PL92500	PL92-500 subsequent funding (Y/N)
PLACE	Place code (US Census)
POPROW	Population row number
*PPNCANC	Service area non-res pop (RCV + NOT RCV COL)
*PPNTANT	Service area non-res pop (RCV + NOT RCV TRT)
*PPRCANC	Service area res pop (RCV + NOT RCV COL)
*PPRNC	Present resident NOT RCV COL population
*PPRNT	Present residentS NOT RCV treatment pop
*PPRRC	Present resident RCV collection pop
*PPRRT	Present resident RCV treatment pop
*PPRTANT	Sum present res RCV + NOT RCV TRT pop
*PRESNAT	Coded description of existing facility
PRETRT	Industrial flow require pretreatment? (Y/N)
PR1082	Do wastewaters originate before 10/18/72?
*PROJNAT	Coded description of future facility
PSCOST	Eligible project cost for grandfathered needs
PSDATE	Date of step 3 funding
PSGICS	GICS # that grandfathered project
PSI	Grandfathered category (I)
PSII	Grandfather category (II)
PSIIIA	Grandfathered category (IIIA)
PSIVB	Grandfathered category (IVB)
PSLINE	Phased/Segmented EPA-1 line number
*PSSTAT	Grant award status

NEEDS SURVEY DATA DICTIONARY
(continued)

Element Name	Description
*PSYORN	Phased/segmented project? (Y or N)
*RCODE	Current review code
RCOM1	Review comment line 1
RCOM2	Review comment line 2
RCOM3	Review comment line 3
RCOM4	Review comment line 4
RCOM5	Review comment line 5
RECEIVE	Receives discharge from (A/F #)
*REGION	EPA Region code
*REHAB	Major sewer rehabilitation method
RES1990	1990 resident population RCV COLL
RINITS	Initials of State/EPA Region/Headquarters reviewer
RTIME	Review date/time from 1900 clock
RWDBASN	Subbasin number
RWDLAT	Latitude location of facility
RWDLOC	Location code
RWDLONG	Longitude location of facility
*RWDRCH	Reach number
RWDRCHM	Reach miles
*RWDUSE	Generic stream use classification
SMSA	SMSA number
*STACD	"S" or "D" plus state abbreviation
STARTUP	Start up date of new facility
*SUBCODE	Submission code
*TOXCODE	Toxic code
*TREATCH	Projected unit process change code
*TREATTR	Unit process description code
*TREATUS	Unit process use code
*TREATLN	Unit process line
TZFACS	Time zero facility count
TZNEEDS	Time zero needs totals (in thousands)
ZIPCODE	Zip code

Drinking Water Environmental Indicators
FY 87

1. **Public Water Systems (PWS) in Significant Noncompliance (SNC)**
   - Number of PWS in SNC with bacteriological and turbidity maximum contaminant level (MCL) and monitoring requirements
   - By state, the types of actions taken to return PWS to compliance and the number and percentage of SNCs being addressed by each type action

2. **Drinking Water Enforcement**
   - Number of enforcement actions by states and EPA to address SNCs

3. **Compliance Trends**
   - By state, show trends in percentage of PWS in compliance with monitoring and reporting for bacteriological contaminants and turbidity

4. **Population at Risk**
   - Number and percent of population served by systems in SNC and in full compliance

5. **Treatment of Surface Water**
   - Number and percent of surface water systems using filtration or equivalent

Drinking Water Environmental Indicators

I. Public Water Systems in Significant Noncompliance (SNC)

A. Significant Noncompliance Report

1. This indicator tells us the number of public water systems (PWS) defined as being in significant noncompliance (SNC) with bacteriological and turbidity maximum contaminant level (MCL) and monitoring requirements. It also shows, by state, the types of actions that are being taken to return these PWS to compliance and the number and percentage of SNCs being addressed by each type action.

2. The SNC list is generated from the Federal Reporting Data System (FRDS) which contains all PWS violation data submitted by states. The SNC list is distributed to the Regions on a quarterly basis for followup. SNCs may be returned to compliance by state actions or by EPA action if states fail to respond in a timely and appropriate manner. Actions other than formal enforcement may be successful in returning a SNC to compliance. This report tracks the number and percentage of SNCs for which each category of action has been taken, including "no appropriate action". SNCs in this latter category are evaluated to determine appropriateness of direct EPA action. This report is broader than the "Number of Enforcement Actions" indicator and does not specifically show that number. The goal is to have zero SNCs and this report tracks quarterly progress toward that goal. This report does not provide any information about PWS which are in violation of MCL and monitoring requirements, but for which violations are not severe enough to be considered SNC.

B. See Table 1

Table 1

Region 10 Accountability System - Drinking Water Enforcement

A.2. Gross number of SNCs reported by Headquarters, 3 quarter lag.

	1st		2nd		3rd		4th		Total	
	T "02"	A	T "03"	A	T "04"	A	T "01"	A	T	A
Alaska	95	95	93		88		84		84	
Idaho	8	8	8		8		7		7	
Oregon	38	38	31		16		15		15	
Washington	57	57	55		50		48		48	
Totals	198	198	187		162		154		154	

A.3. Number of gross SNCs (B.2) returned to compliance, on a compliance schedule, in receipt of state issued order, state civil referred or criminal filing, or erroneously listed. (No Targets)

	1st		2nd		3rd		4th		Total	
	T "02"	A	T "03"	A	T "04"	A	T "01"	A	T	A
Alaska										
Idaho										
Oregon										
Washington										
Totals										

A.4. Number of none of previous (Unresolved, B.2 - B.3) SNCs receiving acceptable state action. (No Targets)

	1st		2nd		3rd		4th		Total	
	T "02"	A	T "03"	A	T "04"	A	T "01"	A	T	A
Alaska										
Idaho										
Oregon										
Washington										
Totals										

A.5. SNCs with no acceptable action to date

	1st		2nd		3rd		4th		Total	
	T "02"	A	T "03"	A	T "04"	A	T "01"	A	T	A
Alaska										
Idaho										
Oregon										
Washington										
Totals										

T = Target A = Actual

C. **Future Improvements**
No changes in the format or content of this report are envisioned at this time.

II. Drinking Water Enforcement

A. Number of Enforcement Actions

1. This indicator provides quantification of the enforcement activity by the states and the Environmental Protection Agency (EPA) in response to significant noncompliance (SNC) with drinking water regulations.

2. Although this indicator tells us how much formal enforcement activity is occurring, it does not tell us how much activity is occurring at a less formal level or the portion of the total systems in SNC being addressed. This indicator also assumes that formal enforcement is the best approach for all cases of SNCs, which may not be true for many small water systems that have very limited technical and financial resources. Some of the states have lamented the inability to do a comparative measurement of the effectiveness of technical assistance/plan and specification review versus enforcement; ie, the preventive approach versus enforcement for small systems. The goal of the drinking water program is to ensure that public water systems provide consumers with drinking water that does not impose a risk to their health. This can probably be best achieved over the long term by having competent people concerned about the quality of drinking water distributed with enough enforcement to convince all system operators that they need to be concerned. There is some apprehension that enforcement may be more oriented toward short term fixes in that the respondents will focus on alleviating the immediate problem which precipitated the enforcement, rather than maximizing the quality of their drinking water in the long term. Enforcement is also very expensive in terms of regulatory agency resources.

B. Total Enforcement Actions by State

State	FY 85	%SNCs*	FY 86	%SNCs*	FY 87	%SNCs*
AK	4		38		17+8 BY EPA	26
ID	3		17		29	322**
OR	1 BY EPA	7		13	32	
WA	23		45		17	28

Plus 18 compliance schedules spread over 3 fiscal years

* *Percentage of total SNCs addressed by enforcement actions. SNC list not produced prior to FY87. Percentage based on SNCs as of end of previous calendar year; i.e. FY87 based on SNCs as of 12/31/86.*

** *Enforcement actions may be initiated for violations not yet classified as SNC.*

C. **Future Improvements**
A potential change to this environmental indicator would be an attempt to evaluate the relative effectiveness of enforcement versus technical assistance or other activities in various situations. This could be especially useful in deciding which technique would be most effective for a particular case and also in applying limited resources in the most efficient manner.

III. Compliance Trends

A. Monitoring and Maximum Contaminant Level (MCL) Trend Lines

1. This indicator tells us the percentage of Public Water Systems (PWS) that report monitoring and MCL results for bacteriological contaminants and turbidity. These charts graphically show the trend in monitoring and MCL compliance by quarter for each state.

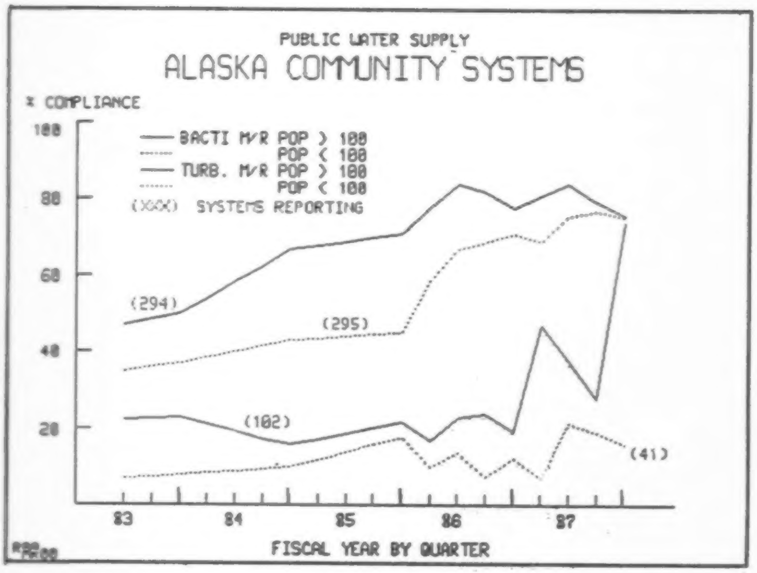
2. These charts are generated from numbers extracted from the Federal Reporting Data System (FRDS) which contains all PWS violation data submitted by states. These trend lines represent compliance information for only two of approximately thirty that are now regulated, but they are considered two of the most important. It can also be seen that compliance by very small PWS, those serving 100 or fewer persons, tends to be lower than for PWS serving more than 100 persons. Other population breakdowns could be selected, but in general small PWS are less sophisticated and have fewer resources than larger PWS. This usually results in lesser ability to understand and routinely comply with requirements.

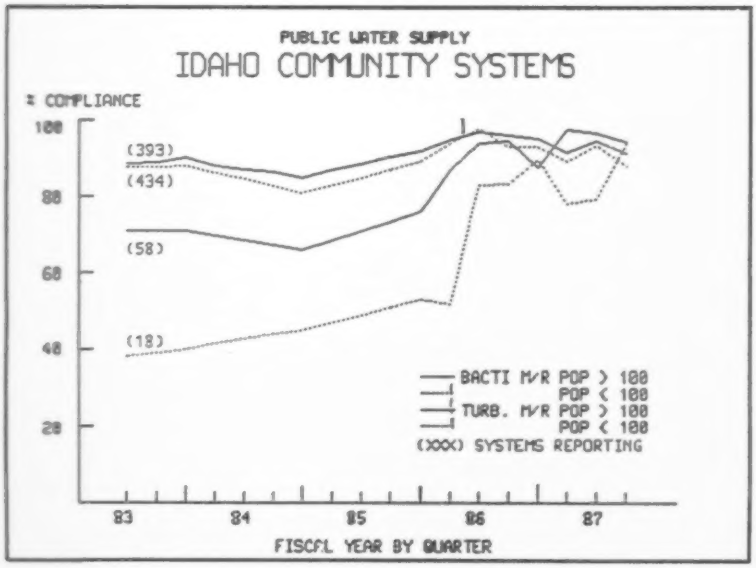
3. For Alaska the compliance rates for bacteriological MCLs may be artificially high because corresponding monitoring compliance rates are relatively low; ie MCLs will not be detected without monitoring. However, it should not be assumed that MCLs will increase disproportionately with improvements in monitoring compliance. There is also a discrepancy between the way Alaska defines bacteriological MCLs and the way EPA defines bacteriological MCLs. The Alaska method results in fewer MCLs and is an issue that is being reviewed with ADEC staff.

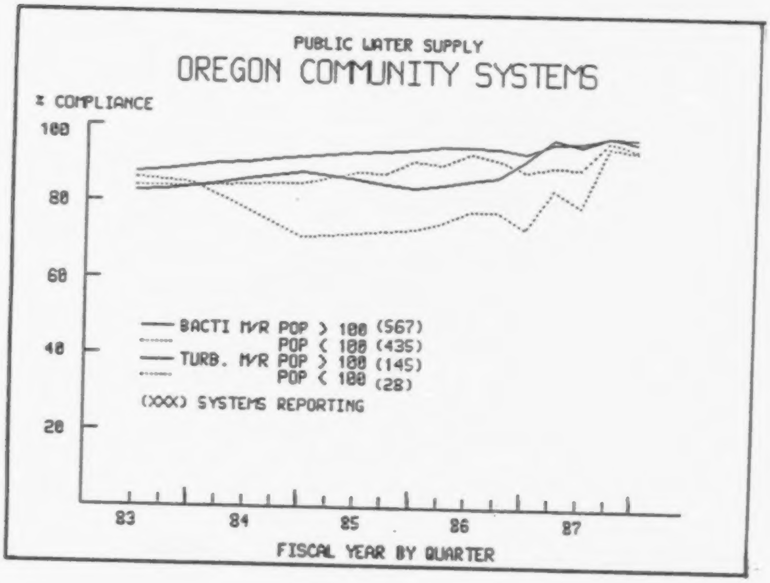
B. Attached charts

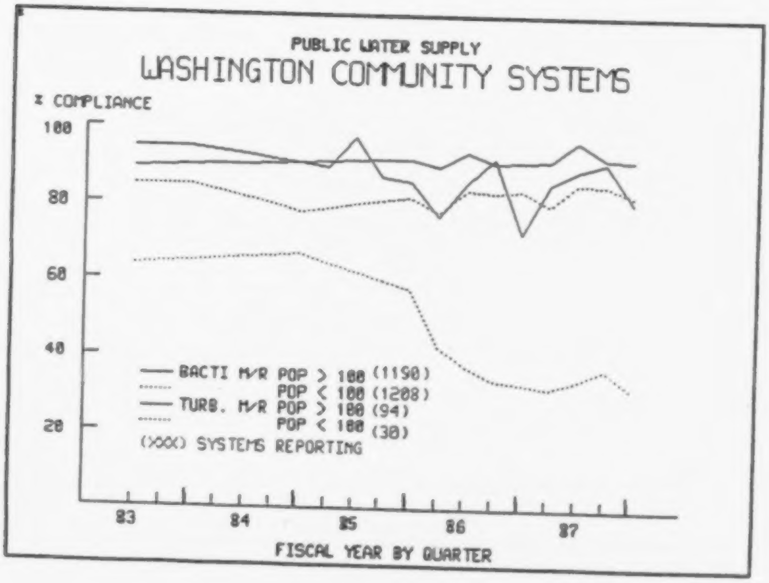
C. Future Improvements

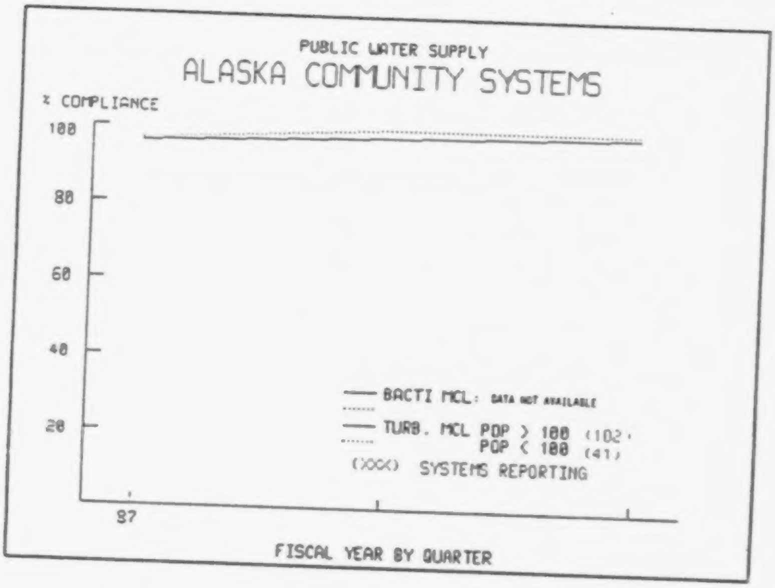
Other population breakdowns could be selected to address some specific issue or additional contaminants could be added in the future. No changes are envisioned at this time.


PUBLIC WATER SUPPLY
ALASKA COMMUNITY SYSTEMS
% COMPLIANCE
100
80
60
40
20
BACTI M/R POP > 100
POP < 100
TURB. M/R POP > 100
POP < 100
(XXX) SYSTEMS REPORTING
(294)
(295)
(102)
(41)
83
84
85
86
87
FISCAL YEAR BY QUARTER


PUBLIC WATER SUPPLY
IDAHO COMMUNITY SYSTEMS
% COMPLIANCE
100
80
60
40
20
(393)
(434)
(58)
(18)
BACTI M/R POP > 100
POP < 100
TURB. M/R POP > 100
POP < 100
(XXX) SYSTEMS REPORTING
83
84
85
86
87
FISCAL YEAR BY QUARTER

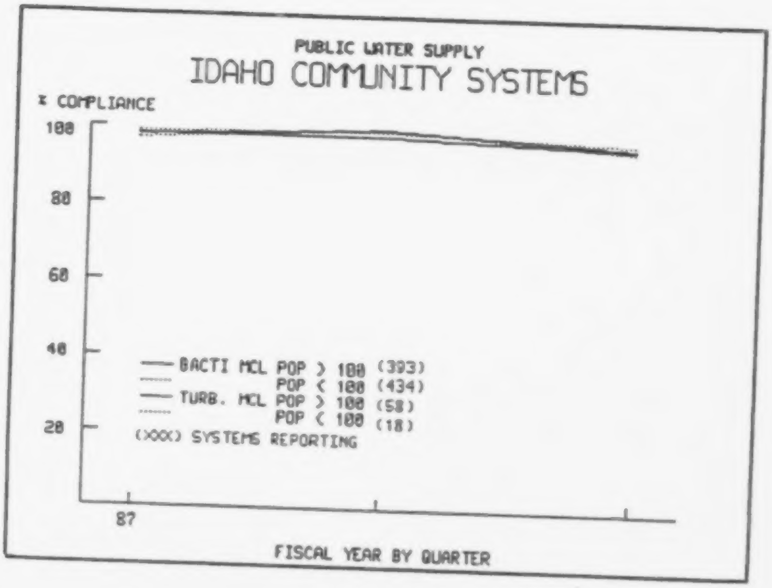

PUBLIC WATER SUPPLY
OREGON COMMUNITY SYSTEMS
% COMPLIANCE
100
80
60
40
20
BACTI M/R POP > 100 (567)
POP < 100 (435)
TURB. M/R POP > 100 (145)
POP < 100 (28)
(XXX) SYSTEMS REPORTING
83
84
85
86
87
FISCAL YEAR BY QUARTER


PUBLIC WATER SUPPLY
WASHINGTON COMMUNITY SYSTEMS
% COMPLIANCE
100
80
60
40
20
BACTI M/R POP > 100 (1150)
POP < 100 (1208)
TURB. M/R POP > 100 (94)
POP < 100 (30)
(XXX) SYSTEMS REPORTING
83
84
85
86
87
FISCAL YEAR BY QUARTER



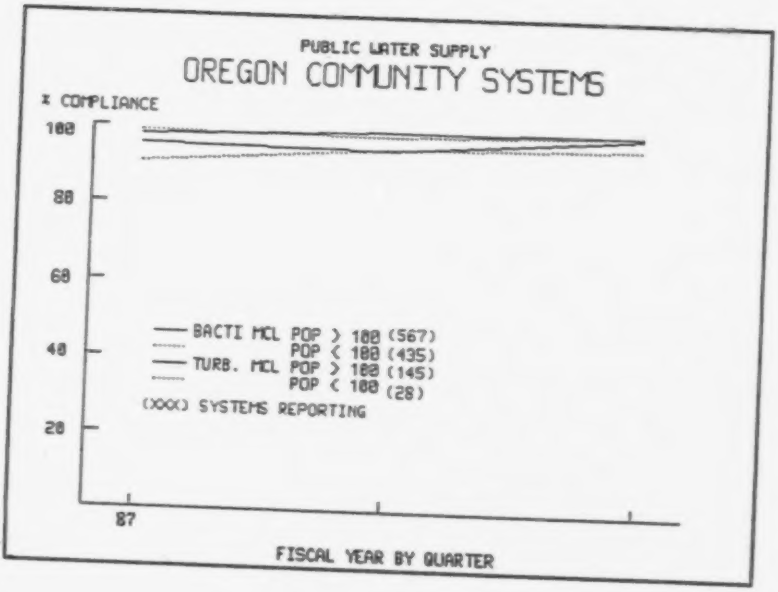
PUBLIC WATER SUPPLY

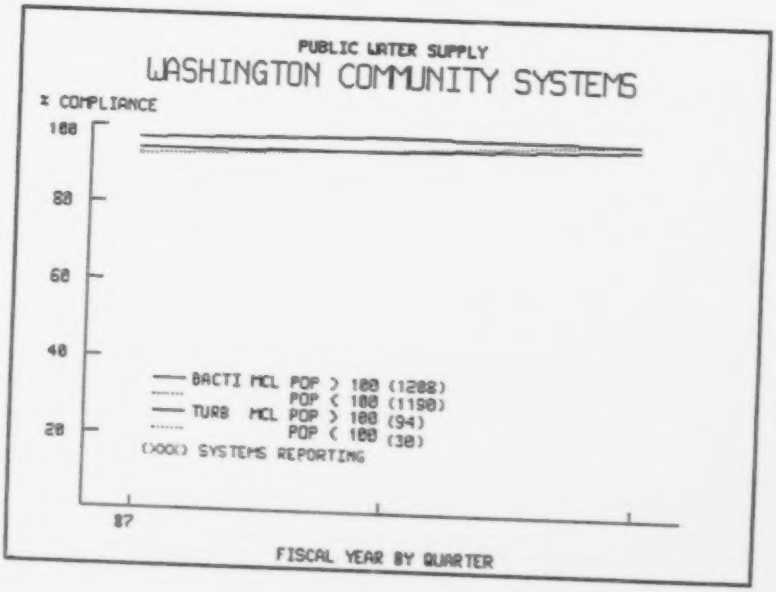
ALASKA COMMUNITY SYSTEMS



PUBLIC WATER SUPPLY

IDAHO COMMUNITY SYSTEMS


PUBLIC WATER SUPPLY
OREGON COMMUNITY SYSTEMS
% COMPLIANCE
100
80
60
40
20
BACTI MCL POP > 100 (567)
POP < 100 (435)
TURB. MCL POP > 100 (145)
POP < 100 (28)
(XXX) SYSTEMS REPORTING
87
FISCAL YEAR BY QUARTER


PUBLIC WATER SUPPLY
WASHINGTON COMMUNITY SYSTEMS
% COMPLIANCE
100
80
60
40
20
BACTI MCL POP > 100 (1208)
POP < 100 (1190)
TURB MCL POP > 100 (94)
POP < 100 (30)
(XXX) SYSTEMS REPORTING
87
FISCAL YEAR BY QUARTER

IV. Population at Risk

A. Population Served by Systems in Significant Noncompliance (SNC) and in Full Compliance

1. This indicator tells us the population and percentage of population served by PWS consuming drinking water from systems known to be in SNC and those in full compliance. SNC is currently defined as having exceeded the maximum contaminant level (MCL) for coliform or turbidity for four or more months in any twelve consecutive months or having done no monitoring for coliform or turbidity for twelve consecutive months. Full compliance is defined as having no violations of either MCLs or monitoring requirements.

2. This indicator requires some interpretation to tell us the number of individuals exposed to contaminated drinking water. There are two major reasons for this. First, only systems which have exceeded the MCL for four or more months are included in the SNC category. Many more systems may exceed the MCL for three or fewer months, thus exposing consumers to contaminated drinking water for shorter periods of time. Second, those systems which are in SNC for monitoring are not necessarily serving contaminated drinking water. Without monitoring, no one knows what they are serving. It is also important to understand that the correlation between consuming water from a system in SNC and the risk to health is not clearly defined. It is safe to presume that health risk is higher when contamination is known to be present or when monitoring has not been conducted to demonstrate that contamination was not detected. The goal for this indicator is zero, but only systems with rather gross noncompliance are classified as an SNC. The health risks associated with lesser degrees of noncompliance can be roughly assessed by looking at the portion of PWS not addressed by this indicator; i.e. all PWS that are not in SNC or full compliance have had some degree of violation with associated potential health risk.

B.1. Population and Percentage of Population Served By Systems in SNC

State	Population*	Previous column as percent of total population served by PWS
Alaska	16,450	5%
Idaho	650	<1%
Oregon	42,150	2%
Washington	57,400	2%
Total	**116,650**	**2%**

* *Numbers have been rounded and apply to the compliance period ending June 1987*

2. Population and Percentage of Population Served by Systems in Full Compliance

State	Population*	Previous column as percent of total population served by PWS
Alaska	114,008	32%
Idaho	636,928	89%
Oregon	1,901,422	92%
Washington	2,700,591	71%
Total	**5,352,949**	**71%**

* *Numbers have been rounded and apply to the compliance period ending in June 1987*

C. Future Improvements

SNC may be redefined in the future to be more restrictive. It might also be possible to track the population served by water systems that were not in complete compliance as well as those that were in SNC. Other possibilities would be to differentiate between SNC for MCL and SNC for monitoring because, presumably, there is higher risk from consuming water known to be contaminated than in consuming water that has not been monitored and may or may not be contaminated.

V.A. Treatment of Surface Water

B. Number and Percent of Surface Water Systems Using Filtration or Equivalent

1. Filtration is known to be an effective method of removing particulate matter, including cysts, bacteria and viruses, from drinking water. Ideally, all public water systems using surface water sources would provide filtration. Therefore, this indicator is a measure of how near we are to achievement of this goal.

2. In some cases other treatment techniques can provide health protection believed to be equivalent to that provided by filtration. These cases, which will probably include Seattle, Tacoma and Portland, all with large populations served, would not be reflected by the subject indicator. This indicator would also assume that filtration systems, once installed, would be properly and continuously operated. Because this assumption may not be justified, this indicator could imply that drinking water produced by all systems with filtration is always safe. Statistics on incidences of waterborne disease outbreaks confirm that improperly operated filtration systems are sometimes at fault. If a measure of the effectiveness of filter operation were added, a more realistic picture would be provided. Operator training and certification could be considered a surrogate measure for the effectiveness of filter operation. Because state review and approval of plans and specifications for installation of filtration systems would be required, this indicator can be assumed to measure the capability of surface water systems to produce safe drinking water, given competent operation.

B. Number and Percent of Systems With Filtration of Surface Source

State	Community Systems		Non-Community Systems	
	#	%	#	%
Alaska	66	53	39	25
Idaho	39	51	34	29
Oregon	58	34	8	5
Washington	57	49	46	46
Indian	2	40	0	0

C. Future Improvements

This indicator currently shows only those systems using filtration because the determinations of "equivalent treatment" have not yet been made on a system by system basis. As "equivalent treatment" determinations are made, beginning in FY90, these numbers can be included with the systems having filtration. There may also be some attempt to measure the quality of operation for those systems with filtration.

Drinking Water Environmental Indicators
Modifications for FY 88 and Beyond

The following measures reflect compliance, enforcement and treatment. In FY88 we will also attempt to develop a "Drinking Water Quality Index" which would provide a concise, general indicator of compliance trends in the program. The decision to use such an index is pending whether our data systems currently have the ability to generate the needed data, or can be easily modified to generate the needed data.

1. **Public Water Systems in Significant Non-compliance (SNC)**
   - By state, number of systems in SNC
   - By state, number and percentage of SNCs for which various "return to compliance" actions have been taken
2. **Drinking Water Enforcement**
   - By state, total number of state and Environmental Protection Agency (EPA) enforcement actions
   - Percentage of SNC addressed by enforcement actions
3. **Compliance Trends**
   - By state, graphically show percentage of PWS in compliance with bacteriological and turbidity monitoring requirements
   - By state, graphically show percentage of PWS in compliance with bacteriological and turbidity MCLs
4. **Population at Risk**
   - By state*, number of persons served by systems in SNC and as percentage of total population served by public water systems
   - By state*, number of persons served by systems in full compliance and as percentage of total population served by public water systems
5. **Treatment of Surface Water**
   - By state*, number and percentage of community systems with surface water sources which use filtration or equivalent
   - By state*, number and percentage of non-community systems with surface water sources which use filtration or equivalent

* Indians as a group treated as an additional state.

Chapter 5: Wetlands

Wetlands Environmental Indicators
FY 87

1. **Acres of wetland lost**
2. **Acres of wetland impacted**
3. **Acres of wetland mitigated for**
4. **Acres of wetland saved due to project modification, withdrawal or permit denial**
5. **Acres of wetlands lost, impacted, and mitigated by wetland type**
6. **Acres of wetland impacted and mitigated for by project type**
7. **Linear feet of shoreline impacted by state**
8. **Cubic yardage of dredged material allowed in-water and upland in Columbia River and Puget Sound**
9. **Time expenditure of EPA personnel on major and minor wetland projects**
10. **Percentage of projects upon which EPA had substantive comments**
11. **Number of significant environmental issues raised by EPA personnel and number of resolutions**
12. **Number of enforcement actions and number of resolutions**
13. **Number of permits denied as a result of EPA comments**

Environmental Indicators of Effectiveness from the Environmental Protection Agency (EPA) Wetlands Protection Section in Region 10; 1987

Purpose

This report was prepared in response to the obvious need to begin to measure the effectiveness (impact) of EPA's efforts to protect wetlands in Region 10. Through the analysis of the data on EPA activities, wetland status, and trends we hope to better focus our attention on those areas where we can be most effective in protecting our regions valuable wetland resources. In addition, we hope to identify new techniques for measuring effectiveness and approaches for protecting the aquatic resource. Our goal is to make the best use of agency resources toward meeting the wetland protection requirements of the Clean Water Act (CWA).

Acknowledgements

I wish to acknowledge the efforts of the following people in the preparation of this document: Steve Waag and Yun Chong Hwang for their invaluable assistance in data entry and presentation (Steve was especially helpful in the programming aspects of this study); Kathy Kunz, Mike Rylko, and Elaine Somers for providing the excellent data on mitigation trends (Kathy developed the entry datasheet, started the database, supervised both data entry and the mitigation trends study); Bill Riley and Ron Lee for their support of the concept and review of the draft documents; Jayne Norton for her efficiency in typing and editing.

Trends Assessment

A. Data Limitations

This assessment is an attempt to observe trends in wetlands losses over time by wetland type[1] and to relate these trends to EPA activities. The assessment is based upon over 2,300 records of EPA evaluations of Corps of Engineers Public Notices for activities requiring a permit under Section 404 of the CWA or Section 10 of the Rivers and Harbor Act for Oregon, Washington, and Idaho. Before presenting these data, it is essential to identify their limitations and the general shortcomings of this analysis.

The database chosen for analysis was limited due to time (i.e., necessity of report preparation by October 1, 1987) and resources (i.e., personnel were available to enter and arrange data only in the month of September). As a result, the data chosen for analyses are taken from the period of October of 1983 to September of 1987 (not quite four fiscal years). Due to filing irregularities, the 1983 data are limited to a fraction of the projects reviewed for the fourth quarter of that year and thus have little meaning in terms of absolute numbers. However, they are still useful in helping to define trends. When completed, the entire database will consist of over 8,000 records extending back to 1979. A thorough analysis of these data will be conducted during FY88. Time constraints also prevented us from including the state of Alaska in our analysis. This is significant as at least 40% of EPA's review of 404 public notices are for projects in

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[1] *There are five wetland types:*
Marine—*open ocean and the high energy coastline*
Estuarine—*deepwater tidal habitats and adjacent tidal wetlands, including emergent saltwater marshes*
Riverine—*all wetland and deepwater habitats within a channel*
Lacustrine—*wetlands and deepwater habitats contained within a depression (i.e., lakes)*
Palustrine—*non-tidal wetlands dominated by trees, shrubs, and persistent emergent vegetation (e.g., wet meadows, freshwater marshes)*

Alaska and Alaskan projects generally involve much greater wetland acreage than those in the other three states. These reviews will also be included in the FY88 environmental indicators report.

The data does not include a consistent number of project outcomes (i.e., the final disposition of the permit by the Corps: issued, denied, issued with conditions, etc.). We have attempted to factor in likely project outcomes but this is especially difficult with the more recent projects. For this reason, the 1987 data generally show a larger acreage of wetlands lost and lower amounts of mitigation[2]. This is less a reflection of reality than it is an indication of uncertainty with regard to final disposition. We fully expect most of these projects will be mitigated and that net loss will be less than in 1986. Most data from the other years also reflect only proposed acreage impacted and proposed mitigation acreage. The actual acreage will be calculated for the FY88 report. We do not anticipate that this will affect the wetlands trends analysis.

The trends assessment is also hampered by inadequate quality control (again, a time-related factor). Thus, we see an anomolous gain in riverine wetlands in the state of Oregon in 1985. This will be rectified in the FY88 report. We have corrected several major errors in the data and feel that the trends are accurate.

We have little data on present wetland acreages in Washington, Oregon, and Idaho or historical losses in these states to compare with these data. We will need such data if we are to draw meaningful conclusions about current losses. This is especially important if we are to concentrate wetland protection efforts in areas where cumulative losses may be seriously threatening the resource.

These data cover only those wetland impacting projects which require a Corps permit. There are many activities lying outside Corps jurisdiction which have substantial adverse impacts on wetlands (e.g., draining wetlands, using wetlands for normal farming practices). In addition, all impacts on isolated wetlands or wetlands adjacent to streams above the headwaters (streams with average annual flows of less than 5 cfs) are excluded from this analysis before 1986 as they were not regulated by individual Corps permits. Wetland losses of less than one acre for such wetlands are still not regulated by the Corps and are thus excluded from the database.

Finally, we should stress that simply looking at acreage loss or gain is not the best way to evaluate wetland impacts. In order to properly assess impacts, we must look at wetland functions and values. We currently do not possess the data to evaluate such losses or gains. This is something EPA will evaluate through the development of its mitigation database.

Due to these data limitations we feel all of these "findings" must be considered preliminary. Until we have completed data quality control, we recommend these findings not be quoted as final.

B. Analysis of Trends

For the purpose of this report, we have concentrated on net wetland acreages lost by wetland type, activity, and state by subtracting proposed mitigation acreage from the acreage proposed to be impacted. Also, we have also evaluated linear feet of shoreline affected (largely due to bank protection projects), in-water disposal of dredged material (by volume), EPA time expenditure on project categories (major, important, and minor projects) and percentage of substantive comments provided. We have evaluated the trends associated with mitigation requirements/success and EPA enforcement activity.

Table 1 and graphs 1 through 15 present the data on acres of wetlands to be impacted, mitigation acreage and net loss by wetland type and state. Two trends are evident from these data. It is obvious that there is a downward trend in net wetland loss from 1984 to 1986. Total regional losses for the year 1986 were under 100 acres. The 1987 data indicate an increase in wetland losses but this is largely due to unresolved mitigation for a few major projects.

The data indicate a total wetland loss to the region of over 1,150 acres in four years, with approximately 56% occurring in Oregon, 42% in Washington, and 2% in Idaho (this calculation includes projects not listed in the table or referenced on the graphs, see below). Oregon accounts for approximately 95% of the palustrine losses (over 600 acres) and 25% of the riverine losses (over 70 acres). Washington accounts for roughly 90% of the estuarine losses (over 250 acres) and 70% of the riverine losses (over 200 acres). The Oregon palustrine losses are due largely to 2 large industrial projects adjacent to the Columbia River. Mitigation for one of these projects will reduce net losses by at least 10%. The reason for the substantial estuarine losses in Washington (which occurred primarily in 1984 and 1987) are as yet undetermined. One would expect these losses to decrease substantially as project outcome is confirmed with the Corps of Engineers.

Statistics not shown on the tables and graphs are important for the trends assessment. There were about 235 acres of wetlands saved as a result of permit denial, project reduction in scope, or project withdrawal. In addition, over 1,600 acres of habitat enhancement projects have occurred or are proposed in the state of Oregon; 1,300 acres of palustrine wetlands enhancement by the Oregon Department of Fish and Wildlife at Summer Lake near the Ana River, 200 acres of enhancement of estuarine wetlands by the U.S. Forest Service on the Salmon River, 68 acres of estuarine and lacustrine wetland enhancement by the U.S. Army Corps of Engineers near Coos Bay, and 32 acres of enhancement of estuarine wetlands by the Oregon Division of State Lands near Astoria. While these enhancement projects may not increase overall wetland acreage substantially, they do contribute to a net gain in wetland functions and values.

[2] ***Mitigation**, for the purposes of this report, is defined as the creation of wetlands or the substantial enhancement or rehabilitation of degraded wetland areas.*

The second major trend noted in the data is the increase in mitigation acreage in the last four years. This is a reflection of several factors. All applicants for permits are aware that any unavoidable adverse wetland impact must be mitigated. This is a result of a concerted state and federal effort to insist upon mitigation as an appropriate requirement for development. The state of Oregon has regulatory mitigation requirements and Region 10 has had a wetland mitigation policy requiring in-kind habitat replacement (if feasible) since 1984.

The increased use of mitigation was the stimulus for a 1987 EPA study (Kunz, Rylko and Somers, unpublished, 1987) entitled "Implications of Wetland Mitigation Practices Pursuant to Section 404 Permitting Activities in Washington State." Several findings in this report are relevant to this trends assessment. In evaluating mitigation projects from 1980 to 1986 (none were identified prior to 1980) Kunz, et. al., discovered that mitigation provided substantially less functional replacement than had been anticipated.

In terms of trends, the mitigation acreage proposed in 404 permits went from a low in 1982 of 25% of acreage impacted to 67% in 1986. The percentage of permits incorporating contingency plans rose from zero to a high of 22% in 1986 and the percentage containing maintenance requirements rose from zero to a high of 11% in 1986. The overall acreage replacement for the 7 year period was only 51% and only 20% of all mitigation plans contained a statement of objectives. Overall the habitat types offered fell short by 33% of those to be impacted, but even this 67% habitat mitigation only proposed to replace 57% of all wetland functions. The distribution of mitigation percentages among wetland types is especially interesting as estuarine habitats were proposed for replacement at 97%, whereas palustrine and riverine habitats were offered at replacement rates of only 40 and 33% respectively.

What is significant about these figures is that they are the result of a paper exercise (i.e., all data were generated from project file information). One can imagine the field results would lower those percentages considerably. In addition, these data do not take into account time delays between project construction and habitat replacement which can result in a net wetland functional loss for several growing seasons.

The number of projects examined by Kunz, et. al., constituted less than 2% of all projects permitted by the Corps during that time period. Since all projects have some impacts, the other 98% resulted in an unmitigated net loss of wetlands.

Preliminary analysis of information gathered during an investigation of mitigation projects (joint effort by Region 10 and Corvallis Environmental Research Lab) indicates that most mitigation projects are generally not successful. Although the majority of sites examined were under two years old, it appears likely that most will not be able to replace the functions and values of the original wetlands. The lack of success may be attributed to the following:

1. The resource agencies have not been successful in negotiating for mitigation plans designed to fully compensate for wetland values lost over time and space. There is a hesitancy on the part of regulators to "force" applicants into complicated and potentially expensive creation/restoration plans. Until methodology can be develop to attribute economic benefits to wetlands preservation, cost will continue to be a limiting factor in most mitigation plans.

2. The science of wetlands creation and restoration is far behind the regulatory use of its techniques. Often, projects are approved without fully understanding if a particular creation/restoration technique is valid. For example, many projects fail due to a lack of understanding of the hydrologic regime necessary to achieve project goals; lack of adequate water is a common cause of project failure. Also, the establishment of a "successful" project is difficult as we lack the methodologies to determine if an artificial wetland is functioning in a similar fashion to a created one.

Table 2 indicates the impacts of various project activities on wetlands. The major activities affecting wetlands are fills for fast land, fills for riprap and bank stabilization and small shoreline structures, road building, and dredging.

The entities with the largest impact on wetlands are the state Departments of Transportation, the Corps of Engineers, Ports, and large industrial developers. With the exception of the Corps, all of these applicants have agreed to provide mitigation where feasible for all unavoidable adverse effects. The Corps has agreed only to avoid or minimize impacts and not to provide replacement habitats.

Table 3 and graphs 16 and 17 indicate the impacts of 404 activities on shorelines. It is difficult to discern any trends in this data except that shoreline protection projects in Puget Sound and the Columbia River contribute a substantial portion of the total affected shoreline, although not as much as one might anticipate. The substantial activity in 1986 is inexplicable at present. These data indicate that we are affecting over 14 miles of shoreline (within Corps jurisdiction) per year in Washington, Oregon, and Idaho.

Table 4 and graph 18 indicate the disposition of dredge material in upland versus in-water disposal for the Columbia River and Puget Sound. Trends are not apparent here except for the shift from 1986 to 1987. The increase in upland disposal in Puget Sound may be the result of disposal site restrictions and the failure of material to pass testing criteria. The Columbia River data reflect large developments on Hayden Island and in Rivergate for which substantial fill is required. It is important to note that while the agency has concentrated on the impacts of in-water disposal of dredged material in Puget Sound, the amount of such material being deposited in the Columbia River system is substantially greater.

Table 5 and graph 19 illustrate the time expenditure of EPA personnel in the project categories developed by EPA headquarters (i.e., major, important, minor). Basically, the data illustrate that EPA hours are allocated as they should be on a per project basis. For the 4 year span EPA personnel were spending an average of over 7 hours per major project, 3.4 hours per important project, and 1.5 hours per minor project. The actual times spent working on major and important projects are greater as the accounting system does not adequately reflect effort (employees often do not include time spent in preapplication meetings or telephone discussions with applicants in their estimates of hours expended).

Eighty-two percent of all permits reviewed are for minor projects (e.g., small dock installation), 10% are important and 8% are major projects (e.g., fills of greater than 5 acres). EPA's comments on these project categories appropriately reflect our level of concern. EPA objects to permit issuance for 24% of major projects, 16% of important projects, and 2% of minor projects. EPA staff recommends conditions for 33% of major projects, 26% of important projects, and 7% of minor projects. The percentage of projects for which EPA actually asks for conditions is greater then indicated as many of the projects objected to are approved after appropriate conditions are added.

Table 6 indicates the distribution of EPA comments by state and wetland type and graph 20 summarizes the data by indicating the percent of EPA responses which are substantive (i.e., recommend the permit be held in abeyance, denied, or conditioned). The data show that for Oregon in 1986 and 1987, and for Idaho and Washington in 1987, the trend is toward increasing the percentage of substantive comments. We believe the reason these figures are increasing is a result of the location of 404 personnel in the EPA operations offices in Portland and Boise beginning in 1986. Our increased ability to get into the field and to become more familiar with the complexities of each project have lead to an increase in substantive input to the Corps. From 1983 to 1987, EPA had substantive comments on 71% of the major projects, 5[illegible] of the important projects and 10% of the minor projects. For the four fiscal years, EPA personnel reviewed an annual average of 629 public notices; 299 for Washington, 260 for Oregon and 62 for Idaho.

SPMS data for 1986 and 1987 indicate the following: of 1,256 public notices reviewed by Region 10 staff in FY86, 223 raised significant environmental issues, 129 were resolved, leading to 26 permit denials and 4 permits being issued over EPA objections; of 714 public notices reviewed by Region 10 staff in 3 quarters of 1987, 103 raised significant issues, 75 of which were resolved leading to 13 permit denials and 4 permits issued over EPA objections. Region 10 is currently facing the possibility of having 3 more permits issued by the Corps over EPA objections. The trend has been for EPA and the Corps to come into conflict over project compliance with the 404(b)(1) Guidelines on a more frequent basis. We most often disagree on smaller projects where some mitigation is provided by the applicant.

Enforcement trends demonstrate a similar increased activism on the part of EPA. Since Region 10 hired an enforcement coordinator in 1984, the enforcement actions have increased as indicated in table 7 below:

Table 7

Region 10 Enforcement Activity

Activity	FY83	FY84	FY85	FY86	FY87
Site Inspections				46	107
Administrative Orders	1	2	9	22	8
Referrals to DOJ		1	2		4
Consent Decrees				1	1
Trials					1
Resolutions	1	1	1	12	12

These data reflect the logical evolution of the enforcement program and demonstrate that if we select cases carefully, we can be effective in obtaining resolution. This program can only function effectively with good field support and a commitment of the Office of Regional Counsel. So far we have had an excellent effort on the part of our Operations Office personnel and regional attorneys. EPA has also conducted an enforcement workshop with all Corps districts in the Region except Walla Walla. A trend not reflected in the data is a steady increase in voluntary compliance. This results in a more efficient use of agency personnel by substantially reducing the time requirements of both field personnel and Regional attorneys.

In summary, it is possible to discern several trends from this preliminary data. There has been a general decrease in net loss of wetlands since 1984 for Washington, Oregon, and Idaho accompanied by a corresponding increase in mitigation acreage. The total wetland acres impacted shows no obvious trend. There has also been an increasing trend of EPA requiring more mitigation and more detailed mitigation plans for projects with unavoidable adverse wetland impacts. This has been a steady trend since 1984 when EPA instituted its Regional Mitigation Policy. In addition, the data indicate that over 200 acres of wetlands have been "saved" from destruction over the past 4 years. This corresponds to a more aggressive posture on the part of EPA regarding project compliance with the 404(b)(1) Guidelines. While it is difficult to draw any conclusions about a cause/effect relationship between EPA actions and the observed trends, it is reasonable to conclude that EPA has played some role in these rather positive results.

One note of caution in interpreting these data relates to mitigation. Since it has been recognized that mitigation projects generally do not provide the amount of wetland functional replacement claimed, it is likely that net losses are greater than calculated. While this may not affect the trend toward a reduction in the rate of wetland loss, it does affect absolute acreage values and is of considerable concern to this agency.

There are 3 areas where EPA has been a recognized leader in the last 3 years. One is in interpreting the application of the 404(b)(1) Guidelines to wetland fill projects. This has led to requests for permit denial on several projects and inevitable conflicts with the Corps. EPA's insistence on thorough alternatives analyses has reduced wetland impacts due to resulting project modifications and permit denials or withdrawals.

Secondly, we have taken the lead in all three states on examining the utility of mitigation as a method to minimize wetland losses. This has resulted in an increase both in mitigation requirements being incorporated in conditions of 404 permits and in the improvement in the quality of mitigation plans submitted by applicants to the resource agencies. In addition, we have developed an ongoing program to monitor the success (or failure) of existing mitigation projects. This is complemented with an interagency effort to improve the level of knowledge necessary to accurately assess mitigation plans and to reduce the likelihood of inadequate mitigation requirements.

Thirdly, the increase in EPA enforcement activity has resulted in the restoration of several wetland habitats which may otherwise have remained in a degraded state. EPAs actions on enforcement have encouraged the Corps to become more aggressive in their own enforcement efforts. The Corps and EPA now view each other as cooperating agencies with a common enforcement goal.

Program Status and Direction

The following sections are provided to discuss the other aspects of the Region 10 404 program as they relate to Environmental Indicators.

A. Mitigation

The trends assessment indicates that mitigation is becoming increasingly important in project permitting. At the same time we know from Kunz, et. al., and others that we are not doing a good job of evaluating mitigation plans or of following up to ensure adequate replacement of wetland functions and values. To address these issues EPA is developing a wetland mitigation database to track mitigation projects in cooperation with other resource agencies. In addition, EPA is insisting that mitigation plans contain at least the following elements: an adequate characterization of the wetland functions and values to be lost, a clear statement of mitigation goals, criteria for measuring success, a monitoring plan and a contingency plan (if the mitigation effort should fail). We are also insisting that either a mitigation agreement be signed with the appropriate state and federal resource agencies (with a performance bond) or that the Corps require mitigation as a condition of the permit.

Mitigation banking is a relatively new concept which is becoming more attractive to applicants who foresee several future projects involving wetland impacts. The Astoria Mitigation Bank was created this year to establish an area for use by the Port of Astoria (and other developers in the area) as mitigation for projects which are otherwise permittable under Section 404 of the CWA. EPA was a signatory to the mitigation bank agreement. It assures the Port and resource agencies of an appropriate mitigation site thus providing some certainty regarding future Port development plans.

The Idaho Department of Transportation is also interested in developing a mitigation bank for some of its projects. EPA is involved in this effort as one of many resource agencies. A conceptual framework has been agreed upon but the bank has not yet been established.

One substantial problem concerning mitigation has arisen recently. The Corps of Engineers has stated that they are under no obligation to provide compensatory mitigation for any operation and maintenance project which results in wetland losses. This position has resulted in the unmitigated destruction of over 103 acres of palustrine wetland near the mouth of the Cowlitz River. This fill is the largest unmitigated wetlands fill in Region 10 in the last five years. EPA has vigorously protested this policy as it has obvious significant adverse effects on the 404 wetlands protection program.

EPA will be assessing the potential for habitat enhancement on the thousands of acres of diked tidelands in the estuaries of Oregon and Washington. Successful dike breaching projects offer the best opportunity for redressing historical losses of estuarine habitat. Several completed or on-going projects in this Region offer EPA the opportunity to study the results of dike breaching so that recommendations can be made on future projects. The best opportunity to obtain federal funds for such projects is through the Corps' O&M dike maintenance program. Due to the economic benefits (primarily from salmon rearing) of returning diked areas to the estuary, the option of purchasing land and breaching dikes is one which is more attractive to Corps planners.

B. Enforcement

The success of EPA's enforcement program is the result of very dedicated field personnel and Office of Regional Counsel attorneys. The critical measure of success in this program is the return of wetlands to functional status. This inevitably involves fill removal and site restoration. We have been especially pleased with several developments in this area. We successfully obtained the removal of a 1 1/2 mile long dike which was draining over 600 acres of wetlands in Miller Lake near Klamath Falls, Oregon. This was done via administrative order. It was successful largely because of the cooperation of the state of Oregon, EPA, and the Corps in ordering the restoration. We obtained fill removal and ditch plugging in an area determined to contain a rare prairie grass community type near Corvallis, Oregon. This action restored the hydrology to over 13 acres of wetland. This was also a cooperative state and federal effort. We obtained via a consent decree a substantial penalty, fill removal, and off-site mitigation for 3 violations by the same company in Idaho. This was the first penalty obtained by EPA for a fill violation and established our agency as a real presence in the state of Idaho. We recently (July, 1987) obtained a substantial penalty and/or mitigation for a violation in Big Lake, Alaska via a trial. This is the first successful litigation for EPA concerning a 404 violation since the Region 10 Wetlands Protection Section has become actively involved in enforcement.

The most important aspect of our enforcement program is the cooperative way in which we approach violations.

Our relationship with all 4 Corps Districts is very good. All Corps Districts have requested EPA assistance and in every case we have obtained a successful resolution of the violation. We have obtained voluntary compliance when the Corps asked our assistance in 6 cases in Oregon and 1 in Washington. We have provided warrants for on-site inspections in Idaho and have joined the Walla Walla district in a referral which will allow protection of the largest bog in the state of Idaho.

Future success depends on our working very closely with the Corps in taking formal legal action and in educating the public. Most of the violators encountered are not knowledgeable about the 404 program.

EPA will be taking on new responsibilities under 404 enforcement as it is now be possible to levy administrative penalties (1987 CWA amendments). Since EPA is responsible for all administrative penalties associated with unpermitted discharges (i.e., most violations), this new statutory authority has the potential to quickly overwhelm agency personnel unless we develop strict criteria for applying such penalties. This will require extensive cooperation with the Corps as they often will have the lead in civil cases.

The draft national enforcement MOA with the Corps encourages the development of field level agreements between EPA regions and Corps districts for implementing the enforcement program. We intend to enter an agreement with the North Pacific Division on enforcement cooperation as soon as the national MOA is finalized. Finally, we will conduct an enforcement workshop with the Walla Walla district this fiscal year.

C. Advanced Identification

Region 10 is involved in several programs to identify wetland areas that are potentially suitable and unsuitable for development in locations where such development is inevitable. Using section 230.80 of the 404(b)(1) Guidelines, we work with the Corps and local governments in a planning process which protects sensitive or especially valuable wetlands and helps direct development to less sensitive areas. Projects may be permitted in these less sensitive areas only if they comply with all regulatory requirements (including the necessity to provide mitigation).

The Grays Harbor Estuary Management Plan, begun in 1976, was the first advanced identification (ADID) effort of its kind in the nation. The final environmental impact statement was completed this year and it is now being adopted by local governments in the Grays Harbor Area. We are also involved in ADID efforts in Juneau, Alaska (to be completed next fiscal year), the Colville Delta, and Puget Sound (for dredge material disposal). In addition, we have identified areas in Oregon and Idaho which may qualify for ADID.

As a part of this effort, EPA is conducting a threat assessment to look at wetland areas in Oregon, Idaho, and Washington which may be experiencing considerable development pressure or will be in the near future. This assessment will help to focus our public education efforts.

A logical extension of the ADID process is the use of Section 404(c) of the CWA for denying or restricting the use of aquatic sites for placement of fill material. The Region will be exploring the possibility of using this regulatory mechanism to protect aquatic sites (including wetlands).

D. **Education**

We are developing an outreach program which targets appropriate audiences for education on wetlands benefits and regulations. It is essential that local governments become more aware of the requirements of the 404 program to reduce conflicts between local land use plans and 404 requirements. Education will not only lead to local support for wetlands protection but will also assist our enforcement efforts. Most violators are only aware of the local permit requirements (e.g., building permits). With assistance from the Policy, Planning, and Evaluation Branch, we hope to prepare a brochure explaining the 404 program. This brochure would be distributed to all local government planning departments for inclusion in building permit information kits. We also would like to develop a talk/slide show presentation which can be modified to meet the needs of each audience. Based on the results of the trends assessment and the threat assessment, key audiences (mostly local governments) will be targeted for presentation.

E. Dredged Material Disposal

Region 10 EPA personnel have been involved extensively in the development of evaluation procedures and interpretive guidelines for the disposal of dredged sediments in Puget Sound. It is necessary to develop such procedures for in-water disposal of sediments in fresh water (e.g., Columbia and Snake Rivers) and in the coastal estuaries of Washington and Oregon. We will undertake such an effort in FY88 with the cooperation of the Corps and the States of Oregon and Washington.

As part of the anticipated ADID efforts for contained disposal of contaminated dredged material, EPA will be coordinating with the Corps and the Washington Department of Ecology to develop evaluation procedures, interpretive guidelines, facility design, and treatment requirements.

In a related area, the Wetlands Protection Section will provide technical assistance for managing existing and future marine Superfund sites (e.g., Commencement Bay, Eagle Harbor, etc.). These efforts will involve the application of knowledge gained from ongoing evaluation procedures development, disposal site investigations, and development of new dredging technologies.

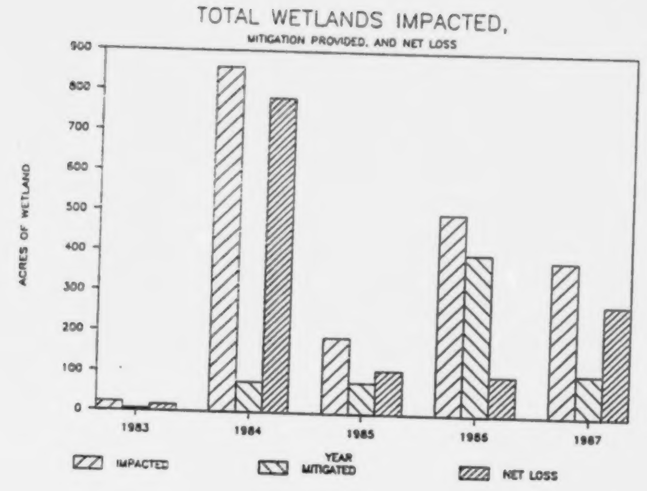
Wetlands Environmental Indicators
Modifications for FY 88 and Beyond

The indicators will be the same for FY 88 as for FY 87, but the database will be expanded to include Alaska public notices and all public notices prior to 1984.

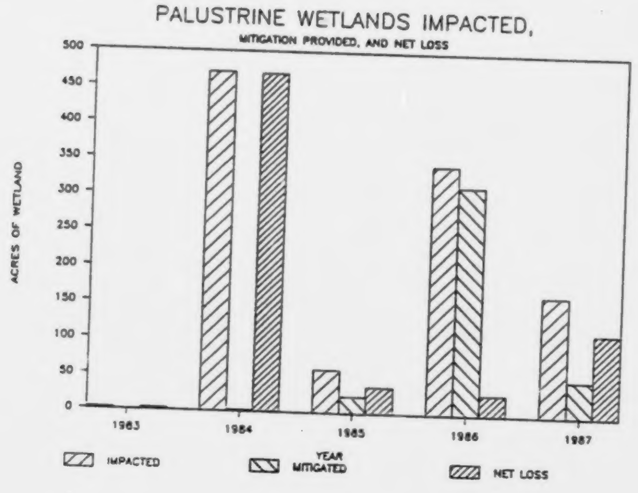
The activities required to obtain the Environmental Indicators are as follows:

1. Enter Alaska data into computer database and analyze data
2. Analyze older data (pre 1984) for all states
3. Update analyses with more accurate information on project outcomes in coordination with the Corps Districts
4. Conduct quality control on database
5. Evaluate all SPMS data
6. Establish a separate Dredged Material Disposal database and update data on dredged material
7. Establish a mitigation database

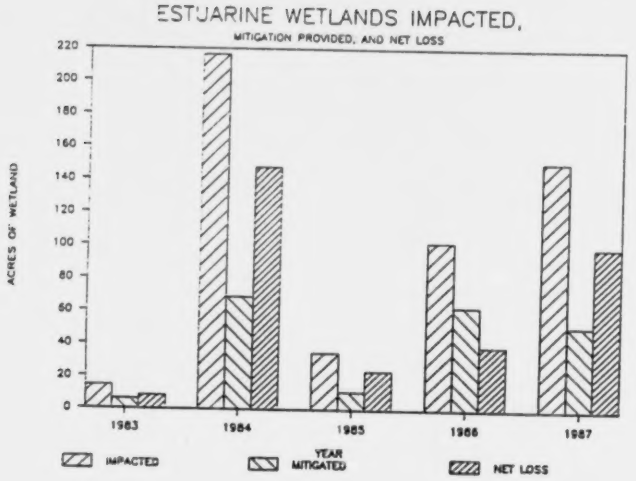
Graph 1


TOTAL WETLANDS IMPACTED,
MITIGATION PROVIDED, AND NET LOSS

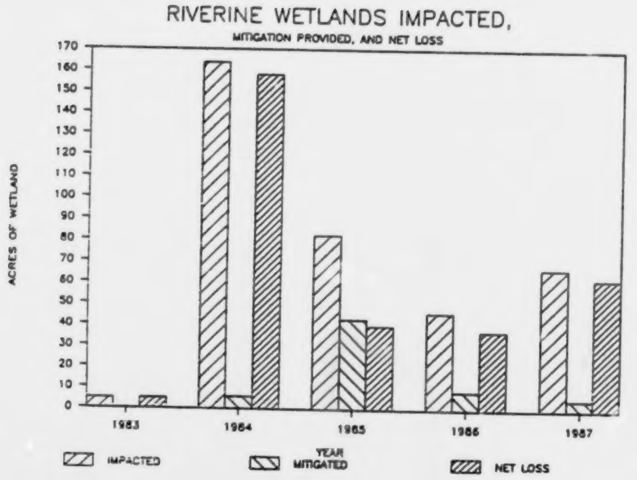
Graph 2


PALUSTRINE WETLANDS IMPACTED,
MITIGATION PROVIDED, AND NET LOSS

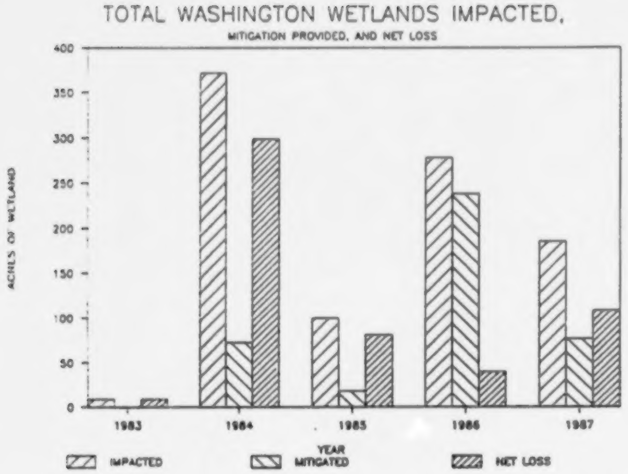
Graph 3



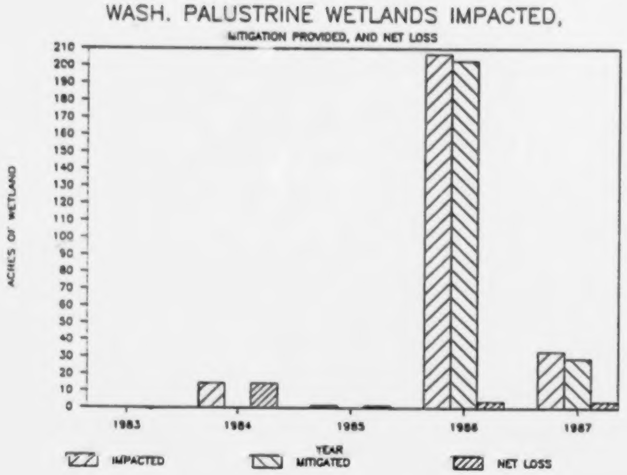
Graph 4



Graph 5



Graph 6



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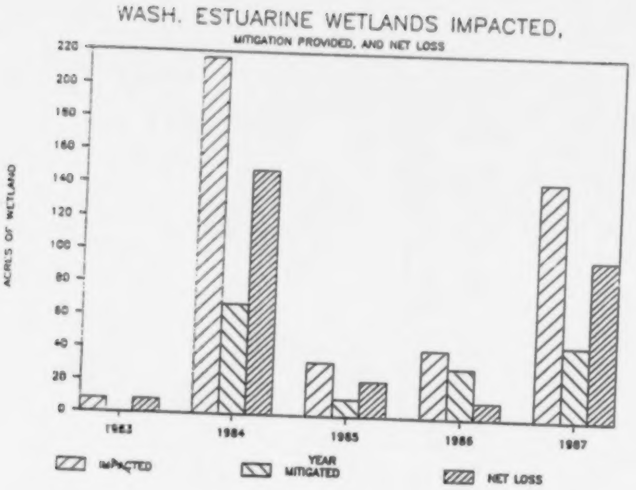
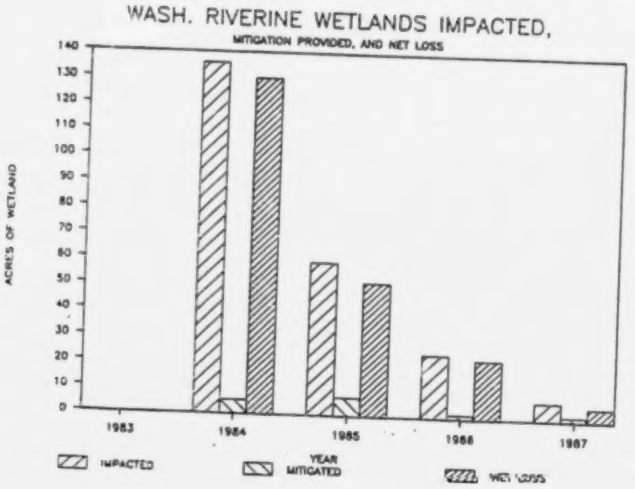
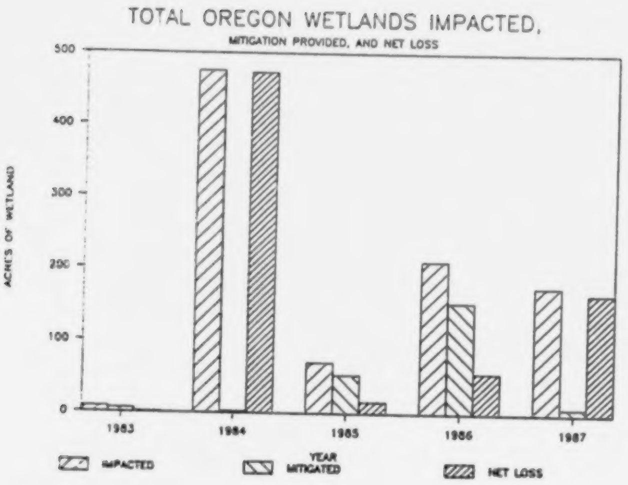


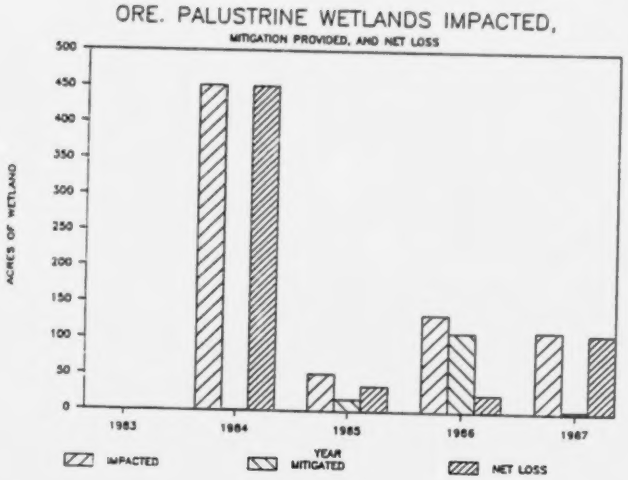
Graph 8



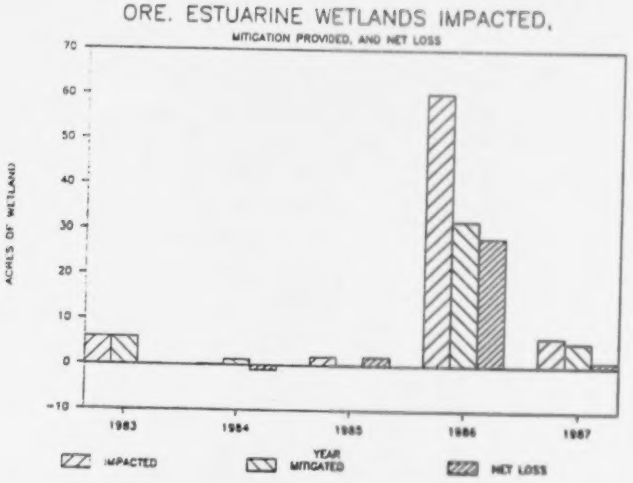
Graph 9



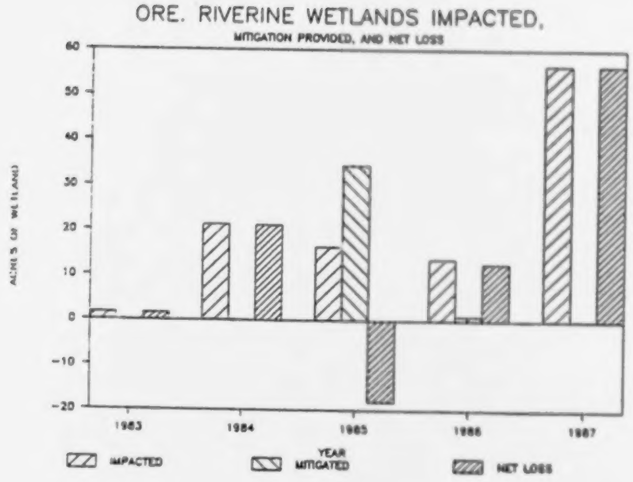
Graph 10



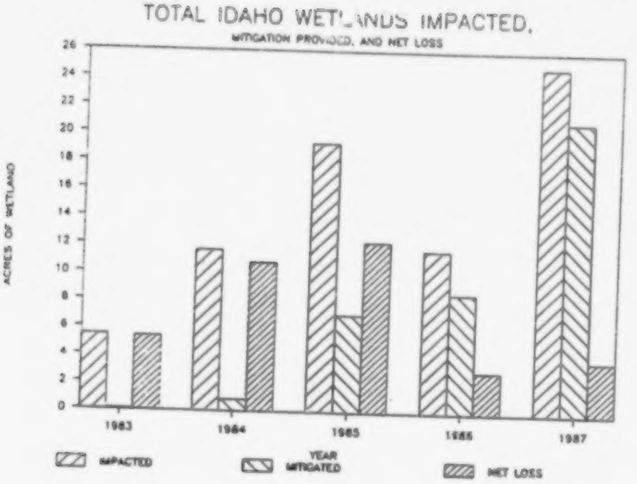
Graph 11


ORE. ESTUARINE WETLANDS IMPACTED, MITIGATION PROVIDED, AND NET LOSS

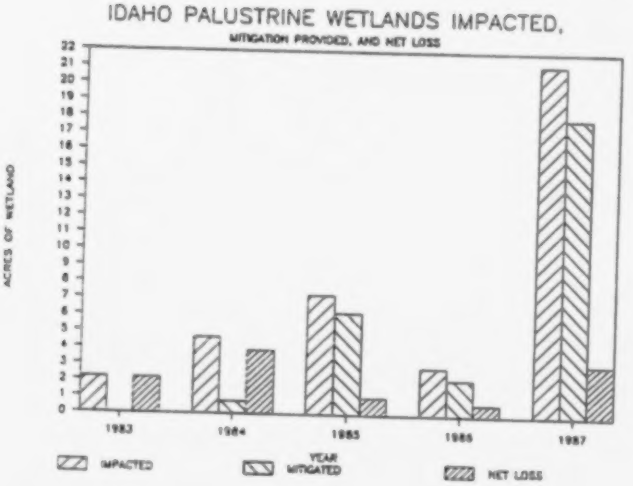
Graph 13


ORE. RIVERINE WETLANDS IMPACTED, MITIGATION PROVIDED, AND NET LOSS

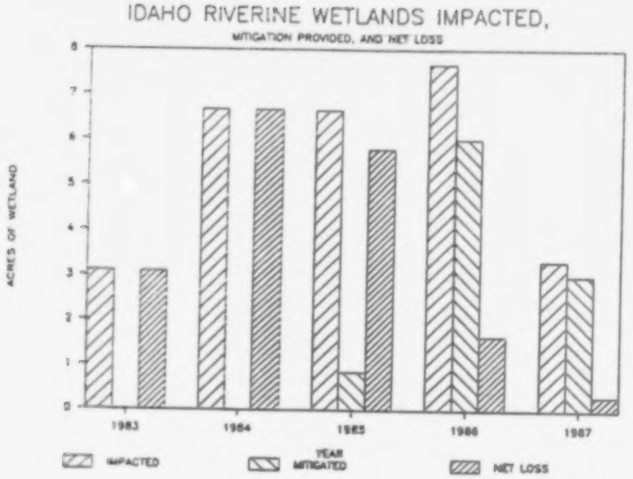
Graph 13



Graph 14

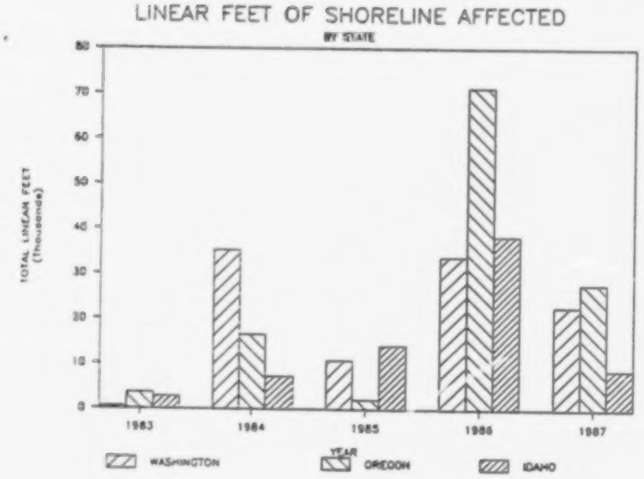


Graph 15


IDAHO RIVERINE WETLANDS IMPACTED,

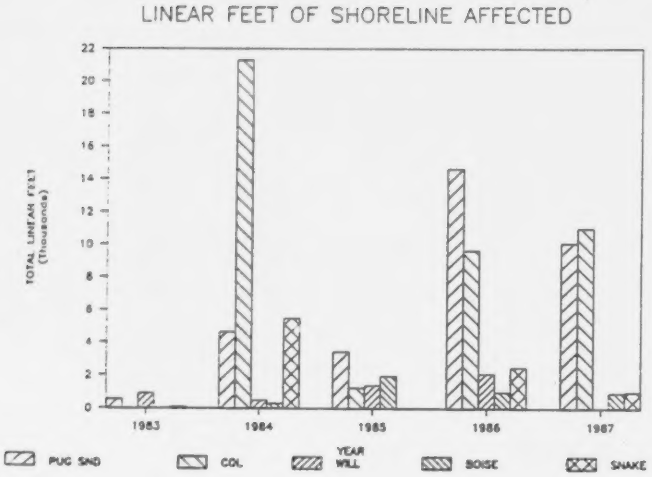
MITIGATION PROVIDED, AND NET LOSS

Graph 16

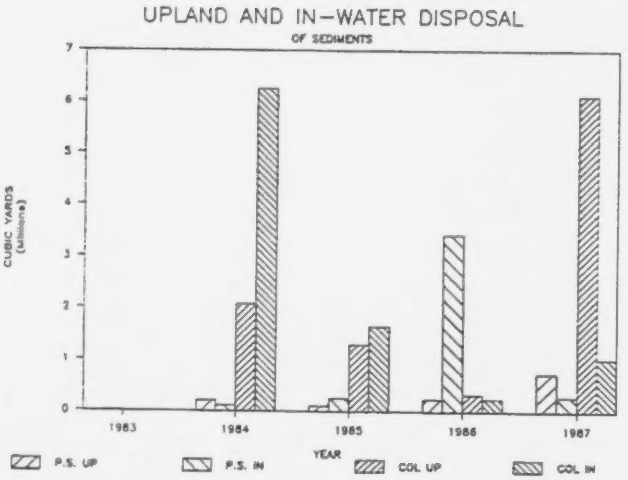

LINEAR FEET OF SHORELINE AFFECTED

BY STATE

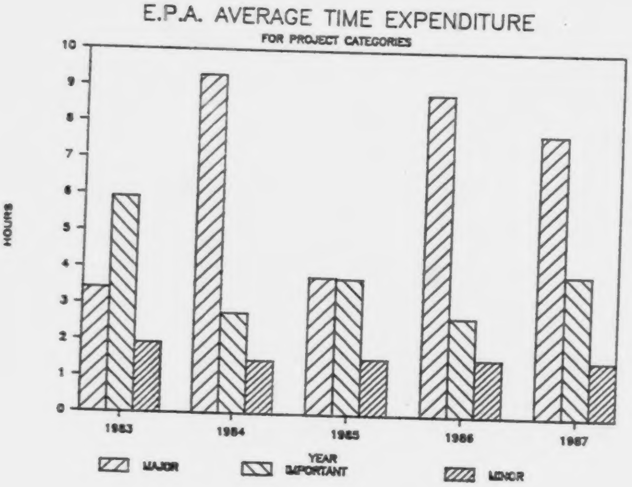
Graph 17



Graph 18



Graph 19


E.P.A. AVERAGE TIME EXPENDITURE
FOR PROJECT CATEGORIES

Graph 20

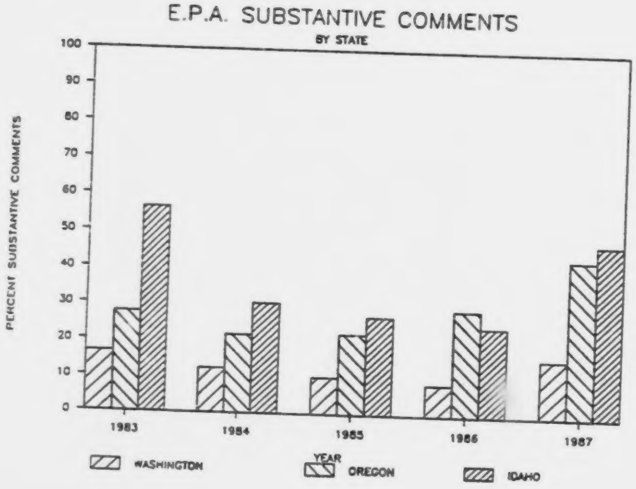

E.P.A. SUBSTANTIVE COMMENTS
BY STATE

TABLE 1

Acres of Wetlands Impacted/Mitigation Provided/Net Loss
(P - Palustrine, E - Estuarine, M - Marine, L - Lacustrine, R - Riverine)

STATE	TYPE		1983			1984			1985			1986			1987	
		IMPACT	MIT.	NET	IMPACT	MIT.	NET	IMPACT	MIT.	NET	IMPACT	MIT.	NET	IMPACT	MIT.	NET
	P	0.00	0.00	0.00	14.50	0.00	14.50	1.36	0.00	1.36	206.70	202.80	3.90	33.22	29.31	3.91
WA	E	8.40	0.00	8.40	216.11	67.50	148.61	33.18	11.00	22.18	41.84	31.17	10.67	144.38	46.05	98.33
	M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.19
	L	0.30	0.00	0.30	5.46	0.00	5.46	5.96	0.10	5.86	4.78	2.41	2.37	0.73	0.00	0.73
	R	0.20	0.00	0.20	135.79	5.60	130.19	59.42	7.40	52.02	24.72	1.75	22.97	7.10	1.84	5.26
	TOTAL =	8.90	0.00	8.90	371.86	73.10	298.76	99.92	18.50	81.42	278.04	238.13	39.91	185.62	77.20	108.42
	P	0.50	0.00	0.50	451.34	1301.14	-849.80	51.68	16.95	34.73	134.43	110.16	24.27	112.22	3.65	108.57
OR	E	6.01	6.01	0.00	0.12	201.21	-201.09	1.85	0.00	1.85	60.23	31.90	28.33	6.35	5.31	1.04
	M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23	0.11	0.00	0.11
	L	0.00	0.00	0.00	2.50	0.10	2.40	0.00	2.00	-2.00	2.03	10.80	-8.77	0.11	0.00	0.11
	R	1.55	0.00	1.55	21.26	0.10	21.16	16.28	34.40	-18.12	13.59	0.97	12.62	56.51	0.00	56.51
	TOTAL =	8.06	6.01	2.05	475.22	1502.55	1027.33	69.81	53.35	16.46	210.51	153.83	56.68	175.30	8.96	166.34
	P	2.17	0.00	2.17	4.65	0.75	3.90	7.26	6.20	1.06	2.92	2.20	0.72	21.20	18.00	3.20
ID	E	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	L	0.20	0.10	0.10	0.30	0.10	0.20	5.44	0.00	5.44	1.12	0.44	0.68	0.38	0.01	0.37
	R	3.10	0.00	3.10	6.66	0.00	6.66	6.64	0.86	5.78	7.67	6.01	1.66	3.33	3.01	0.32
	TOTAL =	5.47	0.10	5.37	11.61	0.85	10.76	19.34	7.06	12.28	11.71	8.65	3.06	24.91	21.02	3.89
GRAND TOTAL =		22.43	6.11	16.32	858.69	1576.50	-717.81	189.07	78.91	110.16	500.26	400.61	99.65	385.83	107.18	278.65

TABLE 2

Effect of Various Activities

ACTIVITY	TYPE	1983			1984			1985			1986			1987		
		PROJS.	IMPACT	MIT.	PROJS.	IMPACT	MIT.	PROJS.	IMPACT	MIT.	PROJS.	IMPACT	MIT.	PROJS.	IMPACT	MIT.
1	P	0	0.00	0.00	2	0.10	0.00	1	0.00	0.95	2	0.10	0.00	4	1.15	0.00
	E	10	0.20	0.00	79	2.50	0.00	96	0.96	0.00	88	40.32	17.50	50	95.03	4.40
	R	5	0.00	0.00	65	28.10	0.00	86	1.78	0.87	92	1.57	0.20	58	1.55	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.05	0.00
	L	8	0.10	0.00	72	1.20	0.20	64	5.35	0.00	57	0.46	0.00	23	0.47	0.00
2	P	0	0.00	0.00	2	0.59	0.39	2	5.20	5.30	1	1.50	1.50	3	0.01	0.29
	E	0	0.00	0.00	13	1.70	0.00	14	3.30	0.00	7	15.04	4.00	7	44.02	36.70
	R	3	0.00	0.00	12	2.20	0.00	10	0.93	0.03	9	4.54	4.51	13	3.16	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	3	0.30	0.00	1	0.00	0.00	3	2.45	2.40	0	0.00	0.00
3	P	1	0.50	0.00	0	0.00	0.00	1	1.00	0.95	0	0.00	2.00	2	1.00	0.00
	E	0	0.00	0.00	16	0.85	0.00	8	0.40	0.00	10	0.07	0.00	5	90.52	0.00
	R	0	0.00	0.00	9	1.50	0.00	18	2.81	0.87	8	2.81	0.00	10	1.38	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.05	0.00
	L	2	0.10	0.10	3	0.10	0.00	5	0.20	0.00	5	0.03	0.00	3	0.15	0.00
4	P	0	0.00	0.00	8	5.35	0.00	5	6.40	5.50	11	15.39	9.85	14	18.99	11.17
	E	3	0.30	0.00	29	4.47	0.00	13	2.91	0.00	22	45.36	26.40	13	108.44	9.96
	R	13	0.80	0.00	102	38.77	0.10	77	60.32	0.53	154	11.60	1.29	90	12.21	3.10
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	3	0.21	0.00	3	0.24	0.00
	L	2	0.20	0.00	10	3.56	0.00	7	5.39	0.00	10	2.02	5.30	6	0.54	0.01
5	P	0	0.00	0.00	3	3.10	0.00	6	25.39	5.50	7	0.96	2.26	7	4.56	11.80
	E	3	0.21	0.01	25	2.42	0.00	20	3.37	0.00	24	2.09	0.00	14	10.98	10.60
	R	10	2.50	0.00	81	5.51	0.00	66	11.67	33.53	118	11.18	0.68	48	5.16	0.10
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	3	0.21	0.00	3	0.24	0.00
	L	4	0.40	0.00	16	3.60	0.10	10	0.64	0.00	13	1.45	0.41	5	0.81	0.00
6	P	2	0.67	0.00	13	454.99	0.39	10	15.32	6.09	11	26.65	5.00	39	144.04	24.51
	E	1	0.10	0.00	4	0.59	0.00	5	12.65	0.00	6	11.98	5.17	5	44.41	36.70
	R	0	0.10	0.00	13	38.25	0.00	11	6.68	2.87	13	3.82	0.00	11	38.40	3.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	7	3.[illegible]	0.00	3	5.20	0.00	5	2.10	1.51	3	0.43	0.00
7	P	0	0.00	0.00	2	0.09	0.14	2	2.80	0.00	3	46.35	46.25	4	71.82	0.28
	E	4	6.10	6.00	19	1.82	1.21	19	0.42	0.00	28	15.40	4.00	18	98.46	8.15
	R	3	1.00	0.00	47	2.41	0.00	40	2.21	0.00	48	4.46	0.02	52	38.90	0.00
	M	0	0.00	0.00	1	0.00	0.00	0	0.00	0.00	1	0.01	0.00	2	0.00	0.00
	L	0	0.00	0.00	6	0.40	0.00	8	0.46	0.00	10	0.70	0.00	2	0.22	0.00
8	P	0	0.00	0.00	1	5.00	1.00	1	20.00	0.00	1	46.00	47.00	2	0.20	0.00
	E	1	8.00	0.00	1	65.00	65.00	2	0.00	0.00	9	85.71	47.72	4	38.41	38.40
	R	1	0.00	0.00	28	73.70	5.00	3	0.01	0.00	4	17.21	0.00	8	1.03	0.00
	M	0	0.00	0.00	0	0.00	0.00	1	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.01	0.00	0	0.00	0.00
9	P	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.00	0.00
	E	2	8.00	0.00	11	0.15	0.00	16	3.40	0.00	8	2.50	0.00	8	2.08	1.05
	R	3	0.10	0.00	11	0.05	0.00	7	8.29	0.00	7	0.34	0.01	12	15.23	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.01	0.00	0	0.00	0.00
	L	0	0.00	0.00	0	0.00	0.00	3	0.01	0.00	0	0.00	0.00	0	0.00	0.00

TABLE 2 (cont.)

10	P	0	0.	0.	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	E	0	0.	0.	1	0.00	0.00	2	0.00	0.00	3	0.02	0.00	0	0.00	0.00
	R	0	0.	0.	1	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	M	0	0.	0.	0	0.00	0.00	0	0.00	0.00	0	0.01	0.00	1	0.01	0.00
	L	0	0.	0.	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
11	P	0	0.00	0.00	3	2.50	0.00	0	0.00	0.00	0	0.00	0.00	1	0.15	0.00
	E	0	0.00	0.00	0	0.00	0.00	1	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	R	1	0.00	0.00	12	0.00	0.00	28	0.40	0.00	19	0.20	0.10	6	0.04	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	2.00	2.00	0	0.01	0.00
12	P	0	0.	0.	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	E	0	0.	0.	0	0.00	0.00	1	0.00	0.00	1	28.10	17.50	1	4.40	4.40
	R	0	0.	0.	1	0.10	0.00	1	1.00	0.00	0	0.00	0.00	0	0.00	0.00
	M	0	0.	0.	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.	0.	0	0.00	0.00	1	5.00	0.00	1	0.60	0.00	0	0.00	0.00
13	P	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	1.50	0.00
	E	1	6.00	6.00	4	65.10	65.00	1	0.05	0.00	4	43.90	22.13	1	9.00	2.70
	R	0	0.00	0.00	6	7.80	0.00	2	0.44	0.00	1	0.00	0.00	4	0.00	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	2	0.10	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
14	P	2	2.00	0.00	9	7.85	0.50	10	17.47	12.05	9	18.17	11.15	7	13.62	1.98
	E	0	0.00	0.00	2	0.50	0.00	0	0.00	0.00	7	32.02	27.90	1	1.41	0.01
	R	0	0.00	0.00	22	5.59	0.00	30	1.73	0.65	48	7.38	4.47	43	4.54	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	3	0.10	0.00	0	0.00	2.00	2	0.01	4.80	0	0.00	0.00
15	P	0	0.00	0.00	0	0.00	0.00	1	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	E	0	0.00	0.00	4	1.60	0.00	2	0.20	0.00	0	0.00	0.00	1	90.50	0.00
	R	4	1.70	0.00	5	0.11	0.00	4	0.05	0.00	17	1.47	0.10	4	0.02	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.14	0.00
	L	1	0.00	0.00	0	0.00	0.00	3	0.10	0.10	0	0.00	0.00	3	0.35	0.00
16	P	0	0.00	0.00	5	8.10	0.00	0	0.00	0.00	4	246.11	246.00	2	2.40	0.00
	E	0	0.00	0.00	1	140.00	200.00	1	0.10	0.00	2	0.28	0.10	0	0.00	0.00
	R	6	1.05	0.00	20	5.90	0.00	11	4.71	0.96	18	4.35	1.92	8	1.52	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	1	0.00	0.00	0	0.00	0.00	0	0.01	4.00	0	0.00	0.00
17	P	0	0.00	0.00	0	0.00	0.00	3	2.70	0.00	1	0.10	0.00	0	0.00	0.00
	E	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.01	0.00	0	0.00	0.00
	R	1	0.00	0.00	14	0.70	0.00	14	45.71	0.30	10	0.09	0.01	11	0.06	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	2	0.10	0.00	1	0.00	0.00	2	0.01	0.01	3	0.04	0.00
18	P	0	0.00	0.00	2	0.00	0.00	0	0.00	0.00	0	0.00	0.00	2	0.01	0.00
	E	1	0.00	0.00	14	0.20	0.00	15	5.00	0.00	15	0.00	0.00	5	0.10	0.00
	R	1	0.10	0.00	9	1.90	0.00	3	0.50	0.00	5	2.70	0.10	3	2.00	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.00	0.00	2	0.00	0.00
19	P	0	0.	0.	0	0.00	0.00	0	0.	0.	0	0.00	0.00	0	0.	0.
	E	0	0.	0.	0	0.00	0.00	0	0.	0.	1	0.20	0.20	0	0.	0.
	R	0	0.	0.	1	0.00	0.00	0	0.	0.	0	0.00	0.00	0	0.	0.
	M	0	0.	0.	0	0.00	0.00	0	0.	0.	0	0.00	0.00	0	0.	0.
	L	0	0.	0.	0	0.00	0.00	0	0.	0.	0	0.00	0.00	0	0.	0.

TABLE 2 (cont.)

20	P	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.
	E	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.
	R	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.
	M	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.
	L	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.	0	0.	0.
21	P	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.	0.	0	0.	0.
	E	1	0.10	0.00	1	0.10	0.00	1	0.00	0.00	0	0.	0.	0	0.	0.
	R	0	0.00	0.00	2	0.10	0.00	0	0.00	0.00	0	0.	0.	0	0.	0.
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.	0.	0	0.	0.
	L	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.	0.	0	0.	0.
22	P	0	0.00	0.00	2	2.00	1.00	2	5.10	5.30	0	0.00	0.00	0	0.00	0.00
	E	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	R	6	2.65	0.00	10	4.40	0.00	13	3.03	0.03	12	0.79	0.51	6	2.96	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
23	P	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1	0.07	0.00	0	0.00	0.00
	E	1	0.00	0.00	2	0.10	0.00	1	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	R	0	0.00	0.00	5	0.00	0.00	2	0.00	0.00	3	0.05	0.05	1	0.00	0.00
	M	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.00	0.00	0	0.00	0.00	1	0.00	0.00	1	0.03	0.00	0	0.00	0.00
24	P	0	0.	0.	0	0.00	300.00	4	5.47	5.71	6	53.50	53.50	5	27.61	29.31
	E	0	0.	0.	3	67.50	67.50	1	11.00	11.00	5	52.92	42.22	6	44.51	38.60
	R	0	0.	0.	9	0.70	0.70	10	5.20	5.20	16	5.32	5.32	10	1.75	4.75
	M	0	0.	0.	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
	L	0	0.	0.	0	0.00	0.00	1	0.10	0.10	5	4.23	4.33	1	0.01	0.01

1. Small piers, docks, floats, wharves, piling dolphins, buoys
2. outfall pipes, culverts, tidegates
3. boat ramps, lifts and marine ways, seaplane ramps, ferry terminals, navigation locks
4. riprap
5. fills for small shoreline structures
6. fills in wetlands for fast land, new land
7. dredging--upland disposal
8. dredging--contained in-water disposal
9. dredging--uncontained in-water disposal
10. dredging--ocean disposal
11. dredging--commercial sand and gravel, clam disposal
12. major shoreline facilities
13. major marina construction or expansion
14. road, railroad fills, bridges and causeways
15. jetties, breakwaters, and groins
16. dams, dikes, berms, levees, weirs
17. water intake structures, water diversion structures
18. aqua culture facilities, fish traps, artificial reefs
19. solid waste disposal
20. ocean disposal (other than dredged material)
21. log handling facilities
22. stream channelization
23. submarine cables, utility lines
24. resources/habitat enhancement

TABLE 3

Linear Feet of Shoreline Affected

STATE/AREA	1983	1984	1985	1986	1987
WASHINGTON	648.0	35,349.0	10,892.0	33,879.1	22,781.0
OREGON	3,640.0	16,572.0	2,105.0	71,343.0	27,784.0
IDAHO	2,874.0	7,296.0	14,186.1	38,492.1	8,774.0
TOTAL FOR ALL STATES =	7,162.0	59,217.0	27,183.1	143,714.2	59,339.0
PUGET SOUND	566.0	4,659.0	3,447.0	14,656.0	10,148.0
COLUMBIA RIVER	0.	21,294.0	1,255.0	9,679.0	11,055.0
WILLAMETTE RIVER	920.0	495.0	1,400.0	2,105.0	0.0
SNAKE RIVER	100.0	5,500.0	0.0	2,500.0	1,016.0
BOISE RIVER	0.0	300.0	1,950.0	1,000.0	950.0

TABLE 4

Dredging - Total Cubic Yards and Total Number of Projects by Disposal Method

Disposal Method: 7- Upland Disposal, 8- Contained In-Water Disposal, 9- Uncontained In-Water Disposal
11- Commercial Sand and Gravel, Clam Dredging

REGION	TYPE	1983		1984		1985		1986		1987	
		PROJS.	C.Y.	PROJS.	C.Y.	PROJS.	C.Y.	PROJS.	C.Y.	PROJS.	C.Y.
PUGET SOUND	7	2	4,400	14	211,075	11	105,375	15	242,330	11	752,255
	8	0	0	0	0	0	0	4	3,339,743	1	180
	9	1	15,600	6	115,144	13	255,600	5	93,300	7	291,000
	11	0	0	0	0	0	0	0	0	0	0
TOTAL FOR 8 & 9 =		1	15,600	6	115,144	13	255,600	9	3,433,043	8	291,180
COLUMBIA RIVER	7	0	0	11	2,078,700	18	1,303,680	17	331,985	17	6,119,932
	8	0	0	13	5,727,525	3	501,050	2	245,100	1	35,000
	9	0	0	6	525,750	6	1,156,080	1	139	1	1,000,000
	11	0	0	2	1,200,000	2	780,000	3	3,170,000	0	0
TOTAL FOR 8 & 9 =		0	0	19	6,253,275	9	1,657,130	3	245,239	2	1,035,000
GRAND TOTAL FOR 7 =		2	4,400	25	2,289,775	29	1,409,055	32	574,315	28	6,872,187
GRAND TOTAL 8 & 9 =		1	15,600	25	6,368,419	22	1,912,730	12	3,678,282	10	1,326,180

TABLE 5

Hours Spent on Major/Important/Minor Projects by Comment Type
(H - Hold, V - Advisory, O - Object, C - Conditional)

PROJ CAT	TYPE	PROJ	1983 TOTAL HOURS	AVERAGE HOURS	PROJ	1984 TOTAL HOURS	AVERAGE HOURS	PROJ	1985 TOTAL HOURS	AVERAGE HOURS	PROJ	1986 TOTAL HOURS	AVERAGE HOURS	PROJ	1987 TOTAL HOURS	AVERAGE HOURS
MAJOR	H	0	0	**.	9	181	20.1	5	36	7.2	4	17	4.2	4	18	4.5
	V	2	7	3.5	10	24	2.4	14	43	3.0	12	71	5.9	2	2	1.0
	O	1	8	8.0	6	64	10.6	5	32	6.4	12	54	4.5	21	100	4.7
	C	3	9	3.0	15	103	6.8	25	74	2.9	8	176	22.0	13	190	14.6
	TOTAL =	6	24	4.0	40	372	9.3	49	185	3.7	36	318	8.8	40	310	7.7
IMPORTANT	H	3	19	6.3	11	46	4.1	9	38	4.2	9	25	2.7	3	10	3.3
	V	7	24	3.4	41	75	1.8	38	145	3.8	13	28	2.1	14	60	4.2
	O	2	16	8.0	8	28	3.5	0	0	**.	19	53	2.7	14	33	2.3
	C	2	24	12.0	10	45	4.5	15	53	3.5	21	63	3.0	20	97	4.8
	TOTAL =	14	83	5.9	70	194	2.7	62	236	3.8	62	169	2.7	51	200	3.9
MINOR	H	1	5	5.0	8	30	3.7	4	13	3.2	4	12	3.0	4	5	1.2
	V	45	72	1.6	473	582	1.2	478	697	1.4	533	787	1.4	264	400	1.5
	O	1	3	3.0	9	24	2.6	13	36	2.7	8	20	2.5	8	29	3.6
	C	11	32	2.9	27	129	4.7	25	66	2.6	44	116	2.6	36	59	1.6
	TOTAL =	58	112	1.9	517	765	1.4	520	812	1.5	589	935	1.5	312	493	1.5
GRAND TOTAL =		78	219	2.8	627	1,331	2.1	631	1,233	1.9	687	1,422	2.0	403	1,003	2.4
TOTAL	H	4	24	6.0	28	257	9.1	18	87	4.8	17	54	3.1	11	33	3.0
	V	54	103	1.9	524	681	1.3	530	885	1.6	558	886	1.5	280	462	1.6
	O	4	27	6.7	23	116	5.0	18	68	3.7	39	127	3.2	43	162	3.7
	C	16	65	4.0	52	277	5.3	65	193	2.9	73	355	4.8	69	346	5.0

TABLE 6

Environmental Protection Agency - Comments

STATE	TYPE	1983				1984				1985				1986				1987			
		H	V	O	C	H	V	O	C	H	V	O	C	H	V	O	C	H	V	O	C
WA	P	0	0	0	0	0	8	3	3	1	2	1	1	0	4	3	1	0	11	4	1
	E	0	16	3	0	5	155	8	3	3	139	8	7	0	153	3	6	3	64	3	6
	M	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	3	0	0
	L	0	9	0	0	1	79	4	1	1	71	1	1	0	69	0	2	1	27	0	0
	R	1	5	0	2	6	70	1	8	3	68	0	4	2	58	8	2	2	47	2	7
	TOTAL =	1	30	3	2	12	312	16	16	8	280	10	14	2	284	14	11	6	152	9	14
OR	P	2	0	0	0	2	1	2	4	3	7	2	7	4	5	7	13	1	5	11	11
	E	0	2	0	3	2	14	2	3	1	19	0	7	5	16	5	6	1	13	1	3
	M	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	2
	L	0	0	0	0	0	4	2	1	0	0	0	0	1	2	0	1	0	0	1	2
	R	0	11	0	0	9	157	1	21	2	184	2	36	4	205	12	35	2	95	13	40
	TOTAL =	2	13	0	3	13	176	7	29	6	210	4	50	14	230	24	57	4	114	26	58
ID	P	0	0	1	2	2	1	0	2	1	4	0	3	0	7	1	2	1	8	8	2
	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	L	0	2	0	1	0	12	0	1	1	14	0	1	1	17	0	2	0	6	0	1
	R	1	8	0	8	2	28	1	10	3	25	4	3	0	22	2	7	2	9	3	3
	TOTAL =	1	10	1	11	4	41	1	13	5	43	4	7	1	46	3	11	3	23	12	6
TOTAL FOR ALL STATES =		4	53	4	16	29	529	24	58	19	533	18	71	17	560	41	79	13	289	47	78

Ground Water Environmental Indicators
FY '87, FY' 88 and Beyond

Ground water environmental indicators for 1987 are summarized below. These indicators represent both area-wide and site-specific measures. Since no national or regional indicators for ground water currently exist, our newly developed indicators for FY87 will serve as a baseline against which similar measures in future years can be judged.

1. **Drinking Water Quality Indicator:**
   - percent of drinking water and monitoring wells with nitrates above a level of concern (6 mg/l NO_3)
   - number and percent of public water systems in violation of MCLs
   - population at risk from public water systems in violation of MCLs
2. **Hazardous Waste Indicator**
   - number and percent of sites with ground-water contamination above a health advisory or MCL and moving off site
   - population at risk from contaminants approaching and in drinking water wells
3. **Pesticides Indicator**
   - number and percent of state registered pesticides which are considered leachers by EPA (for 1987, state of Washington data used as pilot—to be expanded to all states in 1988)
   - surrogate measure of the quantity of leachable pesticides in use in vulnerable ground-water areas is still under review and will be pursued in 1988
4. **Underground Storage Tank Indicator**
   - number and percent of corrosion-protected tanks in use
   - a measure of ground-water cleanup through the leaking underground storage tank program will be developed in 1988

Chapter 6: Ground Water

Ground Water Environmental Indicators

Narrative Description

FY87 has been targeted as the year to develop a first cut of indicators covering several Regional Office ground-water related programs and to develop the baseline of information for these indicators. Overall program progress would be judged by evaluating data in subsequent years against this baseline information.

This project has been carried out in combination with the development of Region 10's Ground-Water Data System Pilot Project. Both the Management Committee and Ground Water Task Force have participated in the development of the indicator evaluation system. After considerable debate, Committee members concluded that no singular indicator or pictoral display would be usable by all ground-water related programs. Consequently, separate indicators have been developed for drinking water, CERCLA/RCRA, pesticides, and underground storage tanks. A narrative descriptive of each currently identified indicator is provided below. Charts and tables are attached.

1. **Drinking Water Environmental Indicator:** Water quality information readily available from the Region 10 portion of the Federal Reporting Data System provides a measure of the ambient ground-water quality in the Region. Maximum contaminant level (MCL) violations from public water systems using ground water as a source are tabulated for various types of contaminants, i.e. nitrates, metals, solvents, pesticides. The number of systems in violation in each category will be presented as well as the percentage of systems with violations. Corresponding population at risk figures will also be presented.

   Limitations: There are several limitations to use of the data. Among these are: (1) the data only represent public water systems—private wells, irrigation wells, monitoring wells, etc. are not included in the data base; (2) not all systems are reporting on a regular basis; (3) contaminant violations are reported on samples taken at the point of distribution to the water utility customer—not from the source of supply—therefore we must assume that contaminants noted are present in the ground water and not added during water treatment, storage or distribution (a valid assumption for the chemicals targeted); (4) ground-water contamination at concentrations less than the MCL, but significantly above detection levels, are not reported to EPA by the state and are not readily available for assessment.

Ground Water Program
Environmental Indicators
Data Summary

Regional (Ambient) Ground Water Quality as Measured by Violations of Drinking Water Standards for Public Water Systems using ground water as a source.

Base Year 1986

State	Number MCL Violations	Percent Systems w/Violations	Population Served
Alaska	11	0.9	9923
Idaho	8	0.3	737
Oregon	1	0.04	76
Washington	10	0.2	4180
Totals	**30**	**0.3**	**14916**

Types of Violations

State	Nitrates	Metals	Solvents	Pesticides	Totals
Alaska	0	10	1	0	11
Idaho	8	0	0	0	8
Oregon	0	1	0	0	1
Washington	10	0	0	0	10
Totals	**18**	**11**	**1**	**0**	**30**

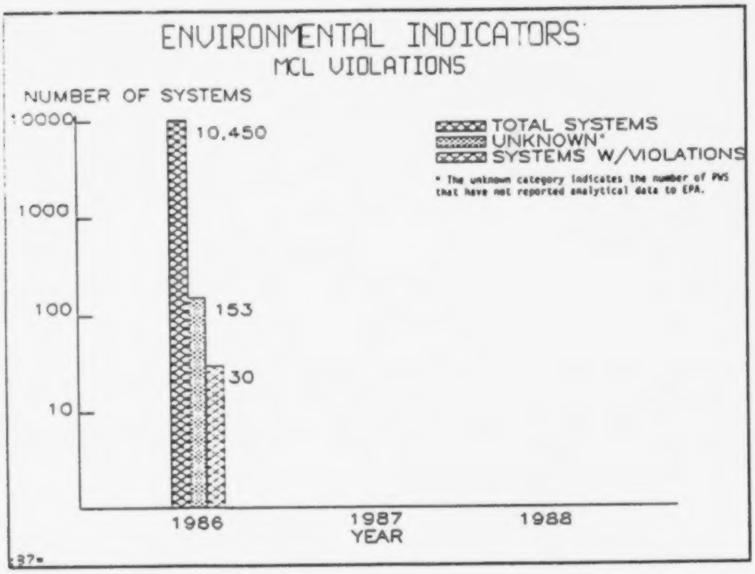
Ambient Ground Water Quality as Measured by Areawide Sources:

Nitrates
Base Year 1986

	Approx # Wells in State/Region	NO_3-N* 6 to 10 mg/l	per cent	NO_3-N >10 mg/l	per cent
Alaska	425	2	0.5	3	0.7
Oregon**	3100	95	3.0	23	0.7
Idaho	1100	18	1.6	8	0.7
Washington	2230	69	3.1	41	1.8
Total Region	**6885**	**184**	**2.7**	**75**	**1.1**

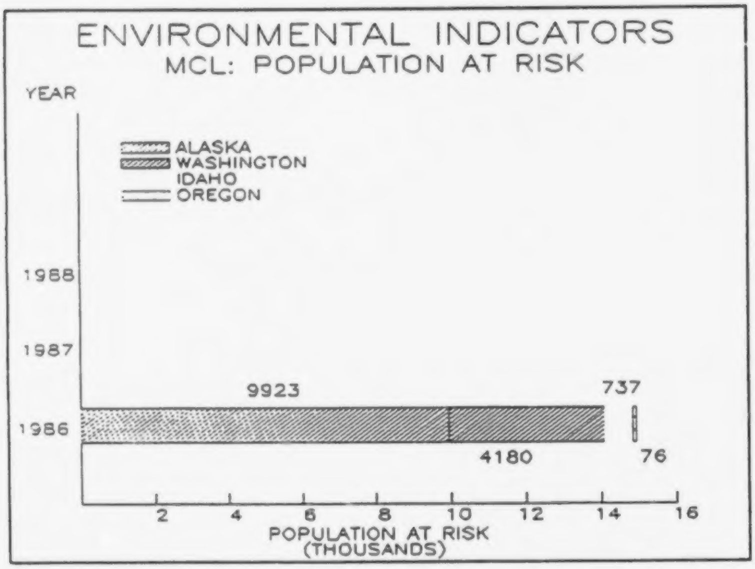
* *Includes total NO_3 with appropriate correction factor*

** *Includes approximately 2900 wells stored in the Regional Oregon public water supply database that had been managed by L. Worley*

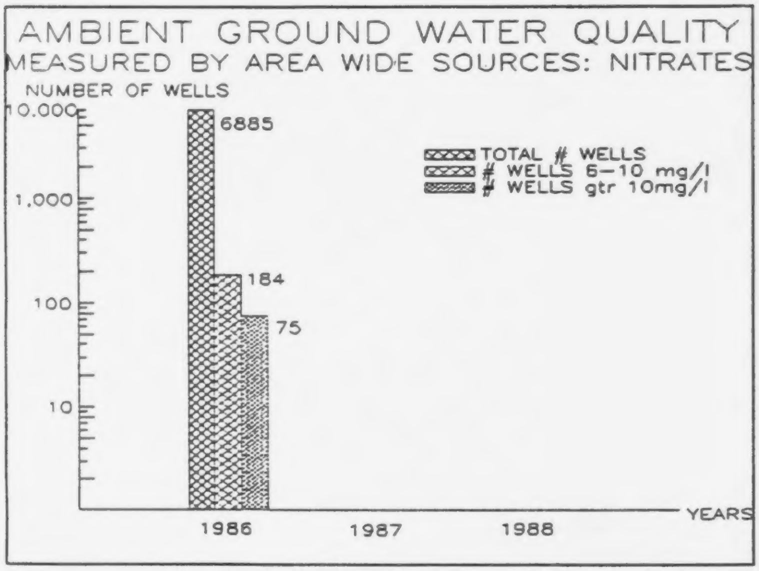


ENVIRONMENTAL INDICATORS
MCL VIOLATIONS

* The unknown category indicates the number of PWS that have not reported analytical data to EPA.



ENVIRONMENTAL INDICATORS
MCL: POPULATION AT RISK


AMBIENT GROUND WATER QUALITY
MEASURED BY AREA WIDE SOURCES: NITRATES
NUMBER OF WELLS
10,000
1,000
100
10
6885
184
75
TOTAL # WELLS
# WELLS 6-10 mg/l
# WELLS gtr 10mg/l
1986
1987
1988
YEARS

2. **Hazardous Waste Environmental Indicator:** Superfund and RCRA sites lend themselves to an indicator which measures the degree to which contaminants in ground water have traveled to place persons at risk. Sites will be categorized in a range from having no known ground-water contamination to those with documented off site ground-water contamination of a drinking water well. The number and percent of these sites in the Region will be identified. For each source status category, the type of contaminant, ranges of contaminant concentration and population affected will be compiled.

Limitations: To obtain this information with minimal resource expenditure, brief personal interviews or a short checklist will be completed by each site project manager. This process provides the opportunity for interpretation variances or other inconsistencies in response. Likewise, grouping sites into categories or contaminants into ranges of concentration values provides generalizations, but are not considered to be major impediments to the value of this indicator as a measure of progress in ground-water protection.

GROUND WATER PROGRAM

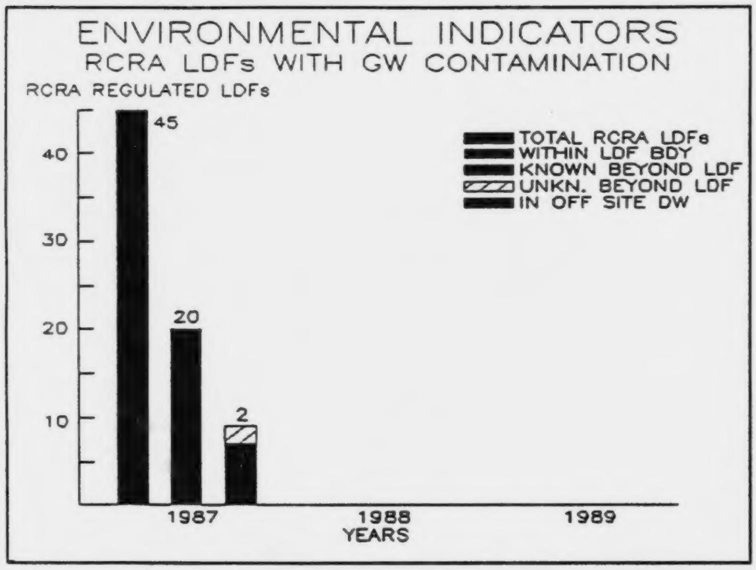
ENVIRONMENTAL INDICATORS

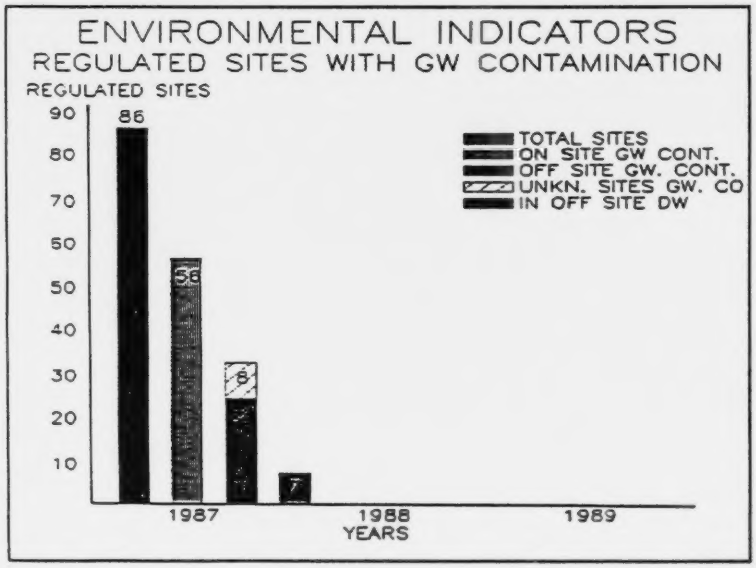
RCRA
SUMMARY TABLE

SOURCE STATUS	# OF LDFs	LDFs ABOVE LOC[2]	POPULATION AT RISK
NUMBER OF RCRA LDFs[1]	45		
TOTAL LDFs WITH NO KNOWN GW CONTAMINATION	25		
GW CONTAMINATION WITHIN LDF BOUNDARIES	20	0	
GW CONTAMINATION BEYOND LDF BOUNDARIES			
UNKNOWN	2	0	
KNOWN	7	0	
GW CONTAMINATION IN DRINKING WATER[3]			

NOTES:

1. LDFs are RCRA regulated Land Disposal Facilities.
2. LOC Contaminants identified above a Level of Concern (above health advisory or drinking water standard).
3. Data not available at this time.


ENVIRONMENTAL INDICATORS
RCRA LDFs WITH GW CONTAMINATION
RCRA REGULATED LDFs
40
30
20
10
45
20
2
TOTAL RCRA LDFs
WITHIN LDF BDY
KNOWN BEYOND LDF
UNKN. BEYOND LDF
IN OFF SITE DW
1987
1988
1989
YEARS


ENVIRONMENTAL INDICATORS
REGULATED SITES WITH GW CONTAMINATION
REGULATED SITES
90
80
70
60
50
40
30
20
10
86
56
8
7
TOTAL SITES
ON SITE GW CONT.
OFF SITE GW. CONT.
UNKN. SITES GW. CO
IN OFF SITE DW
1987
1988
1989
YEARS

GROUND WATER PROGRAM

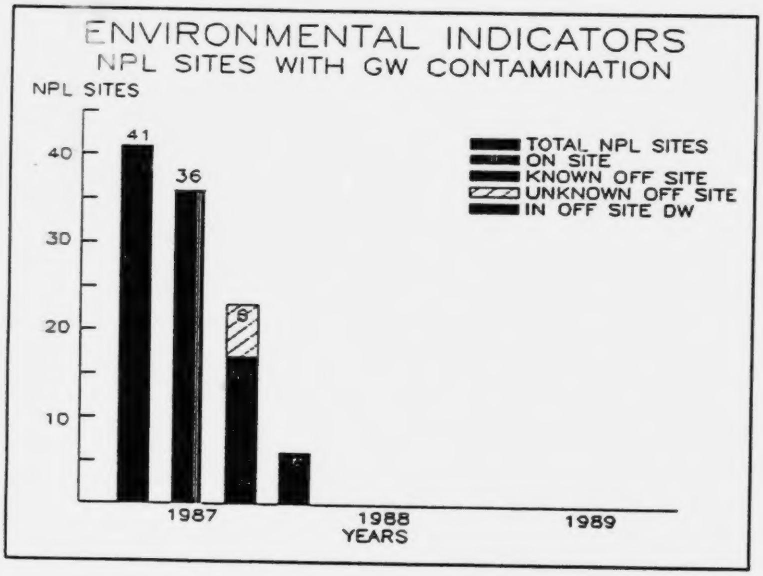
ENVIRONMENTAL INDICATORS

CERCLA
SUMMARY TABLE

SOURCE STATUS	# OF NPL SITES	# NPL SITES ABOVE LOC[2]	POPULATION AT RISK
TOTAL NPL SITES [1]	41		
NPL SITES WITH NO KNOWN GW CONTAMINATION	5		
GW CONTAMINATION ON NPL SITES	36	23	
GW CONTAMINATION OFF NPL SITES			
UNKNOWN	6	1	
KNOWN	17	16	503,000+
GW CONTAMINATION IN NPL OFF-SITE DRINKING WATER	7	7	20,000+[3]

NOTE:

1. The NPL Sites category includes both proposed and final NPL sites.
2. LOC: Level of Concern (above health advisory or drinking water standard.)
3. 99% of the population originally at risk now provided with an alternative water supply.


ENVIRONMENTAL INDICATORS
NPL SITES WITH GW CONTAMINATION
NPL SITES
10
20
30
40
41
36
6
TOTAL NPL SITES
ON SITE
KNOWN OFF SITE
UNKNOWN OFF SITE
IN OFF SITE DW
1987
1988
1989
YEARS

GROUND WATER PROGRAM

ENVIRONMENTAL INDICATORS

CERCLA AND RCRA
SUMMARY TABLE

SOURCE STATUS	# OF SITES	ABOVE LOC [2]	POPULATION AT RISK
TOTAL SITES [1]	86		
TOTAL SITES WITH NO KNOWN GW CONTAMINATION	30		
GW CONTAMINATION ON SITE	56	23	
GW CONTAMINATION OFF SITE			
UNKNOWN	8	1	
KNOWN	24	16	503,000+
GW CONTAMINATION IN OFF SITE DRINKING WATER	7	7	20,000+ [3]

NOTES:

1. Sites: RCRA regulated Land Disposal Facilities and CERCLA NPL Sites (proposed and active).

2. LOC: Contaminants identified above a Level of Concern (above health advisory or drinking water standard).

3. 99% of population originally at risk now provided alternative water supply.

3. **Pesticides Environmental Indicator:** A combination of ground-water monitoring data from special EPA studies and administrative information on pesticides usage are being considered as measures of program progress in protecting ground water. Information for projects recently completed in the state of Washington are used as a pilot to test the practicality of these measures as environmental indicators.

Three separate assessments were made using information from EPA Region 10's recently completed "Survey of Pesticides Used in Selected Areas Having Vulnerable Ground Water in Washington State." Information from this report on both vulnerable ground-water areas and leachable pesticide usage was combined with pesticide water quality data for EPA sampling surveys during the period 1973 to 1984. A fourth assessment measured the proportion of the total pesticides registered for crop, lawn and garden use which are categorized by EPA as leachers to ground water. These assessments are described below.

Findings and Limitations: Pesticide monitoring data were evaluated to determine if the designated vulnerable ground-water areas could be correlated with positive findings of pesticides in ground water. Although data are limited to a small sample size, there does appear to be promise that such designations can be a useful management tool and should be pursued.

Pesticides considered by EPA to have the greatest potential for leaching into ground water were compared to a list of pesticides currently in use in Washington. This listing was then evaluated against the pesticides compounds monitored for in special EPA studies during the period 1973-1984. None of the 31 "leachable pesticides" currently in use in Washington was monitored for by EPA. However, six of eight leachers not in current use were tested for and found in ground water. Our historical data appear to be of extremely limited value in judging the vulnerability of ground water to leachable pesticides or for developing a base line of information against which to evaluate program progress.

A third area considered was the creation of a measure we titled "Leacher-Area". This indicator may be likened to that of a "body burden" of pesticides in a given geographical area. Although there are no pesticide use quantity figures available, we have calculated leacher acres for each county in Washington by multiplying the number of leachable pesticides in use in that county on various crops, by the acreage of those crops grown in that county. This measure holds some promise as a base line against which future similar assessments of leachable pesticide usage can be judged. We will continue to pursue this type of indicator in Washington and obtain data from Oregon.

At present the only measure of pesticides in ground water for which data are reasonably available is the proportion of the total number of state-registered agriculture, lawn, and garden use pesticides which are categorized by EPA as leachers to ground water. While the number of these registered pesticides is not limited to use in vulnerable ground-water areas, this measure can detect over time the change in pesticide use patterns as well as the increase in restricted use pesticides related to ground-water concerns. Data from the state of Washington for 1986-87 are used as a pilot for this baseline study. This indicator will be expanded to other Region 10 states during 1988 and other concepts for pesticides/ground-water indicators will be explored.

TABLE I: WELL SITES USED FOR PESTICIDE SAMPLING IN GROUND WATER

	Well Site Located Inside Designated Vulnerable Area	Well Site Located Outside Designated Vulnerable Area
Contamination Found	26	5
No Contamination Found	0	26

TABLE II

PESTICIDES CONSIDERED BY EPA TO HAVE THE GREATEST POTENTIAL FOR LEACHING TO GROUND WATER

Pesticide[1]	Currently Used in Wa[2]	Tested For[3]	In Ground Water[4]
Acifluorfen			
*Alachlor	x		
*Aldicarb	x		
Aldicarb sulfone			
Aldicarb sulfoxide			
Ametryn	x		
*Atrazine	x		
Atrazine, dealkylated			
Baygon	x		
Bentazon			
*Bromacil			
Butylate	x		
Carbaryl			
*Carbofuran	x		
Carbofuran-3OH			
Carboxin	x		
Carboxin sulfoxide			
Chloramben	x		
alpha-Chlordane			
gamma-Chlordane			
Chlorothalonil			
*Cyanazine	x		
Cycloate	x		
2,4-D		x	x
Dalapon	x		
*Dibromochloropropane			
1,3-Dichloropropane			
*DCPA	x		
DCPA acid metabolites			
Diazinon			
Dicamba	x		
5-Hydroxy Dicamba			
3,5-Dichlorobenzoic acid	x		
*1,2 Dichloropropane	x		
Dieldrin		x	x
Diphenamid	x		
*Dinoseb	x		
Disulfoton	x		
Disulfoton sulfone			

Table II is continued on the next page.

* EPA has national monitoring data showing that these pesticides have leached to ground water as a result of normal use.

[1] List is from the National Survey of Pesticides in Drinking Wateer Wells; July 6, 1987, Table 5-1.

[2] From "Survey of Pesticides Used in Selected Areas Having Vulnerable Ground Water in Washington State", July 1987.

[3] Conducted by EPA Region 10 from 1973 to 1984.

[4] Refers to finding's above detection limits used by EPA laboratory.

TABLE II continued

Pesticide[1]	Currently Used in Wa[2]	Tested For[3]	In Ground Water[4]
Disulfoton sulfoxide			
Diuron	x		
Endrin		x	x
*Ethylene Dibromide[5]		x	x
ETU			
Fenamiphos			
Fenamiphos sulfone			
Fenamiphos sulfoxide			
Fluormeturon			
Heptachlor		x	x
Heptachlor epoxide		x	x
Hexachlorobenzene			
Hexazinone	x		
Methomyl	x		
Methoxychlor			
Methyl paraoxon			
*Metolachlor	x		
*Metribuzin	x		
Metrabuzin DA			
Metribuzin DADK			
Metribuzin DK			
Nitrates			
*Oxamyl	x		
Pentachlorophenol			
Pichloram		x	
Prometon			
Pronamide			
Pronamide metabolite, RH24, 580	x		
Propachlor			
Propazine	x		
Propham	x		
*Simazine	x		
2, 4, 5-T		x	
2, 4, 5-TP			
Tebuthiuron	x		
Terbacil	x		
Terbufos			
Trifluralin			

* EPA has national monitoring data showing that these pesticides have leached to ground water as a result of normal use.

[1] List from the National Survey of Pesticides in Drinking Water Wells; July 6, 1987, Table 5-1.

[2] From "Survey of Pesticides Used in Selected Areas Having Vulnerable Ground Water in Washington State", July 1987.

[3] Conducted by EPA Region 10 from 1973 to 1984.

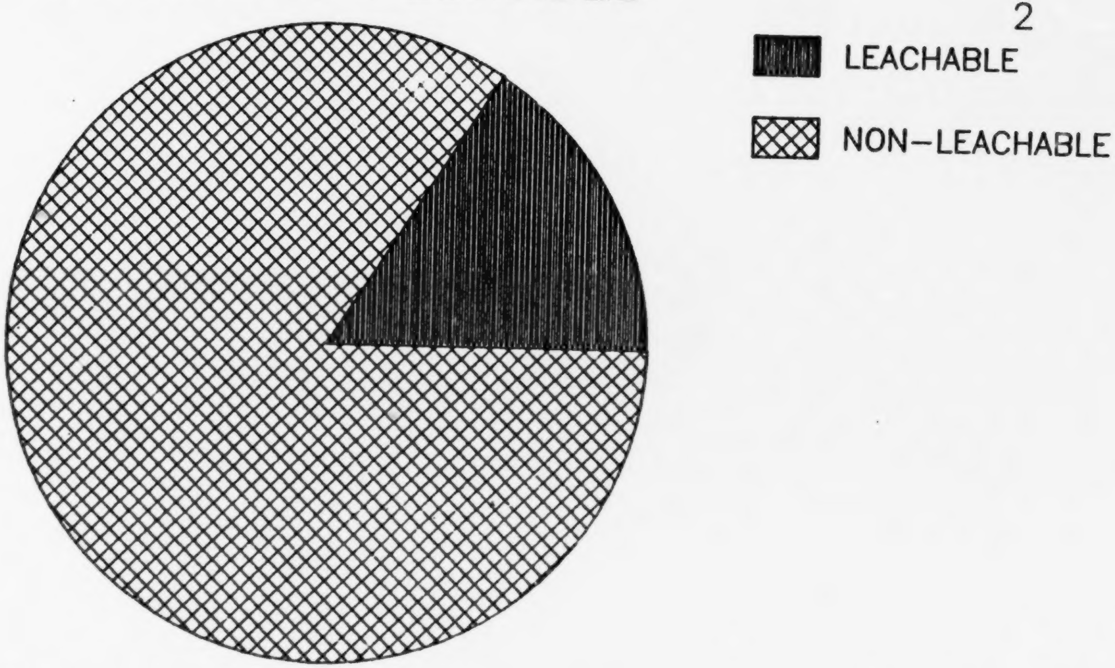
[4] Refers to finding's above detection limits used by EPA laboratory.

[5] Ethylene Dibromide has been sampled in all western Washington counties since 1984. The sample information is in separate files and not yet inserted into the STORET database.

GROUND WATER PROGRAM
ENVIRONMENTAL INDICATORS

Ground Water Protection as Measured by State
Registered Leachable Pesticides[1] in Washington
(Estimate, 1987)

REGISTERED PESTICIDES



NOTES:

1. Pesticides include those used for agriculture, lawn, and garden.
2. Pesticides listed as potential leachers in the EPA National Pesticide Survey, 1987.

4. **Underground Storage Tank Environmental Indicator:** Two major causes of release from underground tanks into the environment are tank failures from corrosion of bare steel tanks and piping failures from improperly installed fill and product dispenser lines. Use of data on each of these sources of potential contamination as environmental indicators for ground-water protection have been evaluated and are described below.

   Documentation of the number, type, and severity of piping failure incidents is highly variable and dependent on the completeness of violation reporting, which historically has been sporadic at best and has occurred primarily at local, not state or federal levels. These anecdotal data are not considered adequate to serve as good indicators of either problem status or as measures of change in environmental program progress.

   Conversely, the tank notification requirements of RCRA, Subtitle I, have provided a baseline of information on tank type, age, material, size, etc. From these data we are able to determine the number and percent of bare steel tanks (likely leachers over time) as compared to other protected steel or fiberglass tanks. Reductions in the number of bare steel tanks can be measured periodically by accessing state data bases. This reduction in the number of high risk tanks can serve as a good measure of both success in achieving program objectives and in environmental protection. Baseline data against which program progress will be judged are shown in Figure 1.

   Limitations: There are four primary limitations to the use of this approach. First, not all tank owners/ operators have completed notification requirements. The universe is sufficiently large, however, to be representative. Second, each state in Region 10 utilizes a similar but different inventory form. Thus, we will be making several assumptions to develop uniformity of the data across the Region.

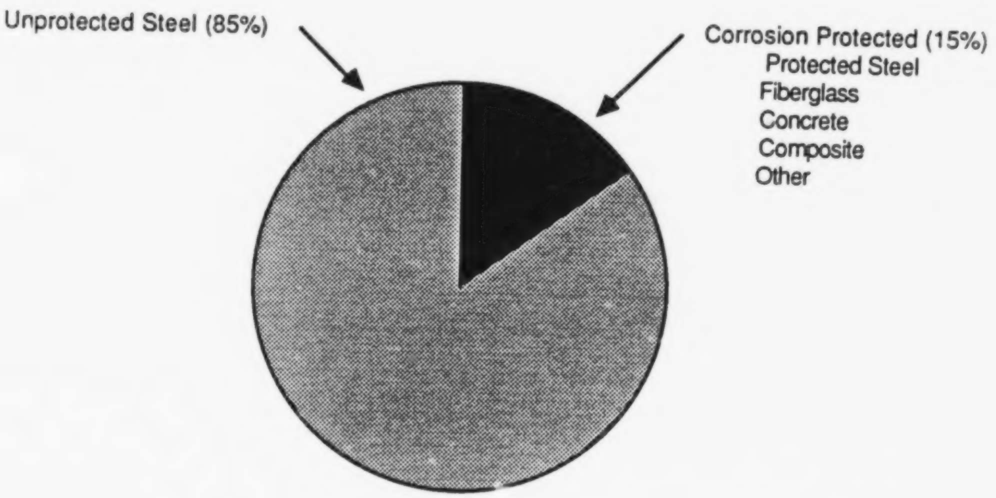
   Thirdly, a large number of notifiers, particularly in the state of Washington, listed their tank material as "unknown." Since the newer, more recently installed fiberglass or protected steel tanks should have been known to the tank owner, we have assumed that all tanks listed as unknown are the older, bare steel construction.

   Finally, previously existing tanks comprise about 96% of the current tank universe, with approximately 4% being replaced each year. There are no requirements for systems which upgrade to notify the state or EPA of changes in their tank status. In addition, under currently proposed regulations, tank owners will not be required to install corrosion protection until 10 years after the effective date of the regulations. Therefore, the proposed indicator will measure primarily new system additions. Despite these limitations, the proposed measure should be used while other additional measures are explored.

GROUND WATER PROGRAM
ENVIRONMENTAL INDICATORS

Ground-Water Protection as Measured by Underground Storage Tank Materials of Construction in Region 10

Underground Storage Tanks - Region 10
(71,877 Total)



New Directions

No environmental indicators have existed for ground water in the past. We are breaking new ground both here in Region 10 and at Headquarters, where a concurrent development phase is underway. We have provided information on the status of development of our measures to this national program effort.

A number of different approaches have been considered. Some show great promise; others are marginal. The process should be continued, with additional data entered to complete the base line measures for each program area.

Chapter 7: Air

Air Environmental Indicators
FY '87, FY '88 and Beyond

1. **Criteria Pollutants**
    - Ambient air quality data and analyses for PM_{10}, NO_2, CO, O_3, lead, SO_2
    - CO: Status of nonattainment area control strategies
    - CO: Number of attainment vs. non-attainment areas
    - O_3: VOC emissions (ozone precursors)
    - O_3: Attainment areas vs. non-attainment areas
2. **Air Toxics**
    - State and local activities to control air toxics
3. **Asbestos**
    - Number of notifications of NESHAPs violations
    - Number of inspections
    - Number of notifications for removal/renovation
4. **Radiation**
    - Public education
5. **Air Enforcement**
    - Number of significant violators and return to compliance

Introduction

This is the first Annual Report of Region 10's Air Programs Branch of the Air and Toxics Division. The Branch is responsible for regional air pollution control, air toxics, NESHAP (asbestos) and radiation programs. An overview of our work in these areas, and a general prognosis of the region's air quality through 1986 is summarized and displayed in the text and graphs which follow.

The report includes a discussion of each criteria pollutant (its program status and environmental indicators), statistical analyses including trends in air quality for each pollutant, a description of air quality planning and enforcement activities, and a summary of the air toxics, NESHAP (asbestos), and radiation programs.

We hope this report will be useful to anyone interested in understanding the status of these environmental issues in Region 10. The information included in this report is current only through December, 1987; the 1988 version will be completed by September, 1988.

Population Trends in Region 10

Between 1980 and 1985, the population in Region 10's metropolitan areas has increased by an average of 8.2%. Whether this influx of residents will have a negative impact on the region's air quality or not remains a question.

Region 10 Metropolitan Areas

Area	1985 Population	% Change
Seattle, WA	2,247,400	+7.4
Portland, OR	1,353,800	+4.3
Eugene, OR	261,300	-5.1
Salem, OR	258,800	+3.6
Anchorage, AK	235,900	+35.5
Boise, ID	191,500	+10.6
Yakima, WA	182,100	+5.5
Tacoma, WA	159,435*	+0.5
Richland, WA	148,400	+2.8
Olympia, WA	142,700	+14.8
Medford, OR	138,000	+4.2
Bellingham, WA	112,300	+5.2
Bellevue, WA	78,597*	+6.4
Everett, WA	56,766*	+4.3
Spokane, WA	56,300	+4.2
Pocatello, ID	45,334*	-2.1
Vancouver, WA	43,398*	+1.3
Longview, WA	29,455*	-5.1
Fairbanks, AK	26,614*	+14.9
Klamath Falls, OR	17,030*	+2.1
Grants Pass, OR	15,699*	+4.4

*** Population figures based upon 1985 U.S. Bureau of Census estimates.

** Percent increase (+) or decrease (-) since 1980.

* Population figures based upon 1984 U.S. Bureau of Census data.

Criteria Pollutant Standards

The following is a list of the current federal standards for each of the pollutants governed by EPA.

National Standards

	Primary	*Secondary*	
Sulfur Oxides			
Annual Average	0.03 ppm		(A)
24 hour average	365 ug/m³		(B)
3 hour average		1300 ug/m³	(B)
Carbon Monoxide			
8 hour average	9.0 ppm		(B)
1 hour average	35.0 ppm		(B)
Ozone			
1 hour average	0.12 ppm	0.12 ppm	(C)
PM-10			
Annual Average	50 ug/m³	50 ug/m³	
24 hour average	150 ug/m³	150 ug/m³	(D)
Nitrogen Dioxides			
Annual Average	0.05 ppm	0.05 ppm	(A)
Lead			
Calndr qtr avg.	1.5 ug/m³	1.5 ug/m³	(A)

(A) *Never to be exceeded*
(B) *Not to be exceeded more than once per year*
(C) *Standard attained when expected number of days per year with maximum hourly average above 0.12 ppm is equal to or less than one*
(D) *Not to be exceeded more than three times in three years*

SIP APPROVALS BY POLLUTANTS

COUNTY	CITY	CO	O3	SO2	NOx	PM10	TSP	Pb
ALASKA								
Anchorage	Anchorage	11/14/86	---	3	4	5	---	03/06/84
Fairbanks	Fairbanks	11/14/86	---				---	
IDAHO								
Ada	Boise	08/05/85	---	3	4	5	---	03/11/85
Bannock	Pocatello	---	---				---	
Caribou	Soda Springs	---	---				---	
Nez Perce	Lewiston	---	---				---	
Power	Pocatello	---	---				---	
OREGON								
Clackamas	Portland	06/22/73	2	3	4	5	04/12/82	07/18/83
Jackson	Medford-Ashland	02/13/87	08/04/86	--			08/15/84	
Josephine	Grants Pass	1	---				---	
Lane	Eugene-Springfield	---	---				04/12/82	
Marion	Salem	---	04/12/82				---	
Multnomah	Portland	06/22/73	2				04/12/82	
Polk	Salem	---	04/12/82				---	
Washington	Portland	06/22/73	2				04/12/82	
WASHINGTON								
Asotin	Clarkston	---	---	3	4	5	---	07/09/84
Clark	Vancouver	---	02/15/83				---	
Cowlitz	Longview	---	---				---	
King	Bellevue	04/29/83	---				---	
	Kent	---	---				---	
	Renton	---	---				---	
	Seattle	04/29/83	04/29/83				---	
Pierce	Tacoma	---	04/29/83				---	
Snohomish	Everett	---	---				---	
Spokane	Spokane	12/14/80	---				---	
Yakima	Yakima	---	---				---	

1. The final rulemaking activity approving the Grants Pass CO strategy has been forwarded to Headquarters for final processing.

2. The State of Oregon has submitted a revision to the SIP for O3. However, EPA is awaiting data before disapproving the revision in light of the recent post-87 attainment strategy for O3.

3. All States have approved SO2 rules; there are no SO2 nonattainment areas.

4. Region 10 has no NOx sources.

5. The newly promulgated PM10 standard was published July 1, 1987. The States have nine months to submit PM10 plans for EPA approval. Anticipate Region 10's SIPs by the end of April 1988.

Particulate Matter (PM_{10})

Environmental Indicators

Programs to reduce emissions of particulate matter have not progressed significantly since the early eighties. This is due in part to the shift in EPA's concern away from Total Suspended Particulate (TSP) toward the respirable, particulate fraction. Major revisions to the National Ambient Air Quality Standards (NAAQS) and accompanying implementation regulations were signed by Lee Thomas, EPA Administrator, on July 1, 1987. The TSP standard was replaced with a standard designed to restrict particulate matter measuring ten microns or less in diameter (PM_{10}). Since this standard has just been promulgated, and State Implementation Plans (SIPs) will not be submitted for approval until after April 30, 1988, it will be impossible to determine whether mitigation activities have reduced ambient concentrations. However, once the SIPs are approved, state and local agencies and the areas currently in violation will have three years to meet those standards.

The Agency's new regulations were intended to shift concern about particulate pollution from the larger fraction to the smaller, more potentially hazardous particles. The smaller (10 $_u$m or less) particles are deamed more hazardous because of their ability to pass into the lower regions of the lungs. The agency has concluded that the new regulations will better protect public health.

Fine particles are generated in a number of ways, and can be emitted directly, resuspended, or transformed in the atmosphere. Typical sources include woodstoves, fireplaces, factories, power plants, construction and agricultural activities, motor vehicles, prescribed fires (slash/field burning), and natural windblown dust. Atmospheric transformation of emitted gases such as sulphur dioxide and volatile organic compounds cause formation of these respirable particles as well.

The new regulations became effective July 31, 1987. The 24-hour primary, or health-based standard limits ambient concentrations of PM_{10} to 150 micrograms per cubic meter (ug/m^3). In addition to the 24-hour standard, a new annual standard was set at 50 ug/m^3.

The decision was made by the Agency to establish the secondary, or welfare-based, PM_{10} standards at the same level as the primary standards. Secondary standards protect the public from adverse soiling and nuisance effects. While the agency considered the possibility of setting a secondary TSP standard in addition to the PM_{10} standards, it was decided that the recommended primary PM_{10} standards would provide adequate protection, due to the fact that air pollution control equipment is designed to capture both large and small particles.

The welfare effects of particulates also include the potential impairment of visibility. This effect is most strongly related to fine particle (less than 2.5 microns) levels. The Agency has been evaluating alternative approaches to address the visibility problem. One possibility is to establish a separate fine particle standard designed specifically to protect visibility. Visibility is a major issue in Region 10 where slash burning is a common practice. Each of the states in Region 10 has an approved visibility SIP with control measures to protect specific vistas.

State and local agencies, working with Region 10 staff, began developing a PM_{10} monitoring network in 1983. With all the existing data, Region 10 undertook an analysis which classified all counties in the region into three groups based on their probability of attaining the new PM_{10} standard. Group I consists of those areas with a 95% or higher probability of not immediately attaining the standard. Group II consists of those where the air quality data was not sufficient to determine whether the standard would be attained. Group III consists of areas determined to have a high probability of attaining the standards.

Areas identified as Group I are required to submit new PM_{10} SIPs with complete PM_{10} control strategies including a demonstration of attainment and maintenance of the standard. Attainment will be required within the statutory timeframes established by the Clean Air Act (three years - or five years if a Section 110(e) extension is granted). States with areas designated Group II must submit SIPs, but the SIPs need not contain full control strategies or include demonstrations of attainment and maintenance; instead, these states can submit "committal SIPs" which supplement existing TSP strategies with enforceable plans to collect and analyze PM_{10} data. Upon discovery that a Group II area is violating the PM_{10} standards, a full SIP revision will be required. Both groups are required to submit SIPs within nine months after July 31, 1987. For areas designated Group III, EPA requests that states submit the existing control strategies for review and assessment of their implementation, enforceability, and ultimate effectiveness in maintaining the standards. SIP revisions for both Prevention of Significant Deterioration (PSD) and monitoring plans are required for all three groups and must be submitted within the nine month timeframe.

There are currently eighteen Group I areas and nine Group II areas in Region 10 (see map and PM_{10} groupings chart). The sources causing PM_{10} problems are woodstoves, fireplaces, industrial point sources, re-entrained road and fugitive dust, and possibly slash/field burning and agricultural activities. Figure 1 suggests the sources that may be causing the PM_{10} problems in each area.

Particulate matter has been a regulated pollutant since the early 1970's and progress has been made in reducing ambient levels. Industries have been required to install equipment which has effectively reduced emissions of particulate, however, additional controls may be required on sources in areas exceeding the standards.

All of the states in Region 10 have woodstove regulations at one or more levels of government. The following list explains the current woodstove programs region-wide:

Alaska

State State regulation establishes requirements during air quality alerts and maintains separate requirements for "wood smoke control areas".

City Juneau City and Borough ordinance requires sale of only Oregon certified woodstoves. They have an opacity standard and a curtailment program that goes into effect during episodes of air quality impairment.

Idaho

City Boise city ordinance with a short term/long term control approach;

Certification program effective July 1, 1987;

Incentives for upgrading existing woodstove to an Oregon certified woodstove (low interest loans);

Curtailment program during air quality alert;

Idaho Power offers reduced electric rates to qualified customers (woodstove owners) who applied.

Pinehurst—City initiated an education program.

County Ada County and Treasure Valley Communities (Nampa, Garden City, Emmett and Eagle)—certification program and low interest loans incentive program implemented in all of these areas as well as in Boise.

Oregon

State Oregon has the first program of its kind in the nation. Requires certification of residential wood combustion units before sale;

City/ County Medford and Jackson County submitted ordinances which were approved by the Oregon Department of Environmental Quality and EPA in 1984. These ordinances contained a variety of mitigation measures for controlling woodstove pollution.

Eugene and Springfield have a voluntary curtailment program which is implemented during periods of air quality impairment.

Washington

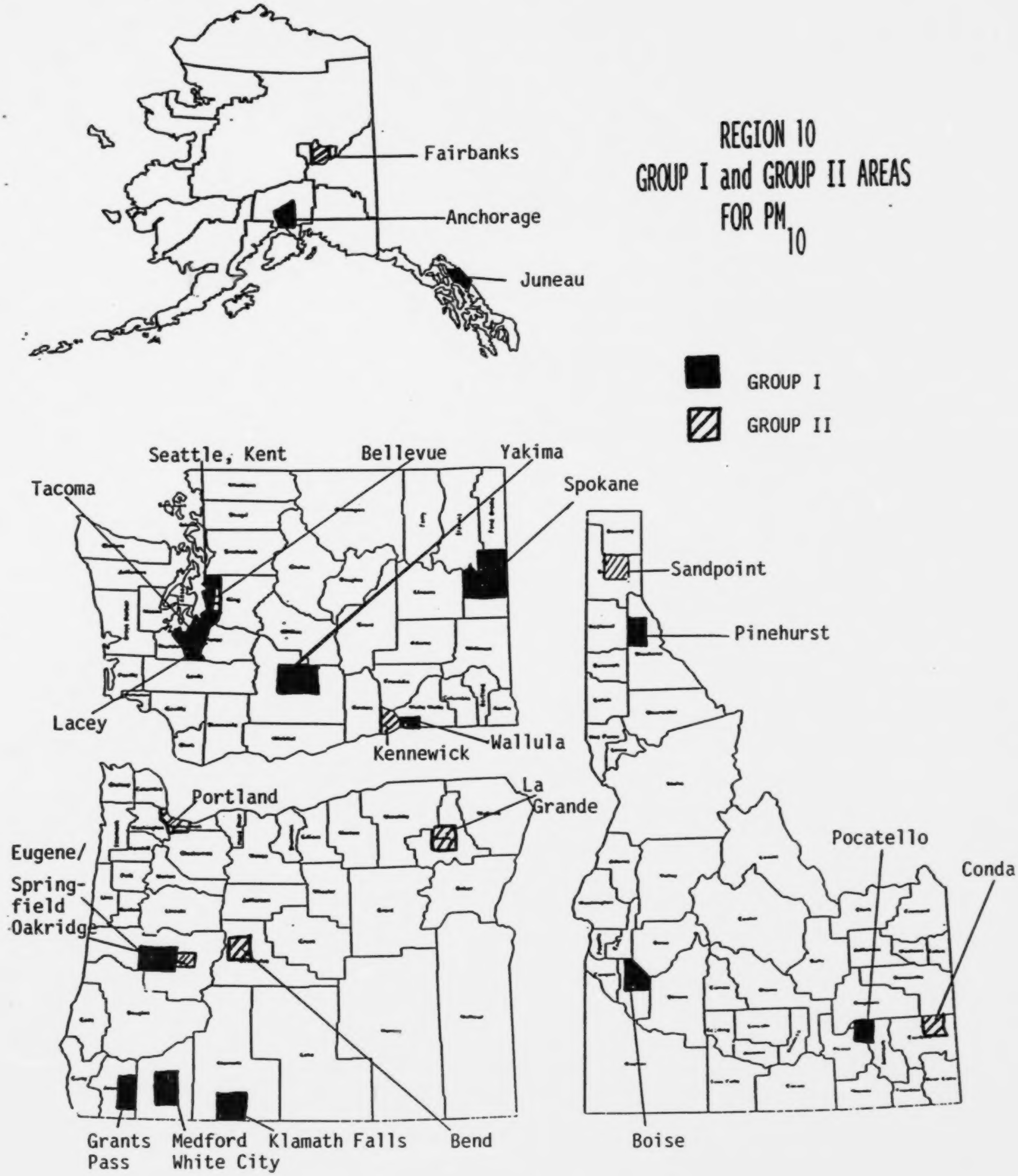
State Washington State legislature passed bills in 1987 requiring the Department of Ecology to develop a regulation by January, 1988. This legislation stipulates provisions be included in the regulation for:

- Sale of Oregon certified woodstoves;
- Opacity standards;
- Prohibition on burning of garbage and other substances not specifically designated as a woodstove fuel;
- Education program;
- Curtailment of woodstove use during episodes and periods of air quality impairment.

City Yakima has a regulation which sets opacity limits, prohibits burning garbage and other substances producing noxious fumes.

County Okanogan County (specifically the Methow Valley)-The County approved an ordinance which limits the number of new woodstoves allowed in dwellings and other buildings; allows the sale of only Oregon certified woodstoves, and establishes a curtailment program during periods of air quality impairment.

REGION 10
GROUP I and GROUP II AREAS FOR PM_{10}


Fairbanks
Anchorage
Juneau
■ GROUP I
▨ GROUP II
Seattle, Kent
Bellevue
Yakima
Tacoma
Spokane
Sandpoint
Pinehurst
Lacey
Kennewick
Wallula
Portland
La Grande
Eugene/ Springfield
Oakridge
Pocatello
Conda
Grants Pass
Medford White City
Klamath Falls
Bend
Boise

PM_{10} AREA GROUPINGS

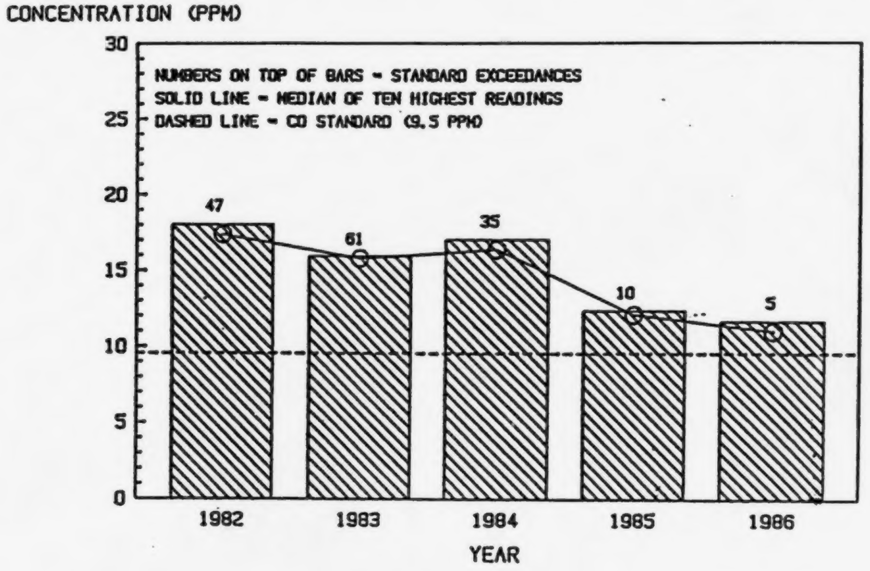
STATE	COUNTY OR BOROUGH (CITY)	AREA GROUPING	POTENTIAL CAUSE(S)
ALASKA	ANCHORAGE (ANCHORAGE)	I	Mobile source re-entrainment, woodstoves
	JUNEAU (JUNEAU)	I	Woodstoves
	FAIRBANKS (FAIRBANKS)	II	Re-entrained fugitive dust sources
IDAHO	ADA (BOISE)	I	Woodstoves, re-entrained fugitive dust sources
	SHOSHONE (PINEHURST)	I	Woodstoves, re-entrained road dust
	BANNOCK/POWER (POCATELLO)	I	Industrial point sources, fugitive dust sources, woodstoves?
	BONNER (SANDPOINT)	I	Woodstoves, industrial point sources, possibly field/slash burning
	CARIBOU (CONDA)	II	Industrial point sources, re-entrained fugitive dust sources
OREGON	LANE (EUGENE & SPRINGFIELD) (OAKRIDGE)	 I II	 Woodstoves, industrial point sources Woodstoves
	JOSEPHINE (GRANTS PASS)	I	Industrial point sources, woodstoves
	JACKSON (MEDFORD) (WHITE CITY)	I I	Woodstoves, industrial point sources Industrial point sources, woodstoves
	KLAMATH (KLAMATH FALLS)	I	Woodstoves, industrial point sources?
	DESCHUTES (BEND)	II	Woodstoves
	UNION (LA GRANDE)	II	Woodstoves
	MULTNOMAH (PORTLAND)	II	Re-entrained fugitive dust sources
WASHINGTON	PIERCE (TACOMA)	I	Industrial point sources, re-entrained fugitive dust sources, woodstoves
	KING (SEATTLE & KENT)	I	Industrial point sources, re-entrained fugitive dust source woodstoves
	THURSTON (LACEY) YAKIMA (YAKIMA)	I I	Woodstoves Woodstoves
	SPOKANE (SPOKANE)	I	Industrial point sources, woodstoves, re-entrained and unpaved road dust, field burning?
	WALLA WALLA (WALLULA)	I	Industrial point source
	BENTON (KENNEWICK)	II	Re-entrained road dust, agricultural activities
	KING (BELLEVUE)	II	Re-entrained road dust, woodstoves

Nitrogen Dioxide (NO_2)

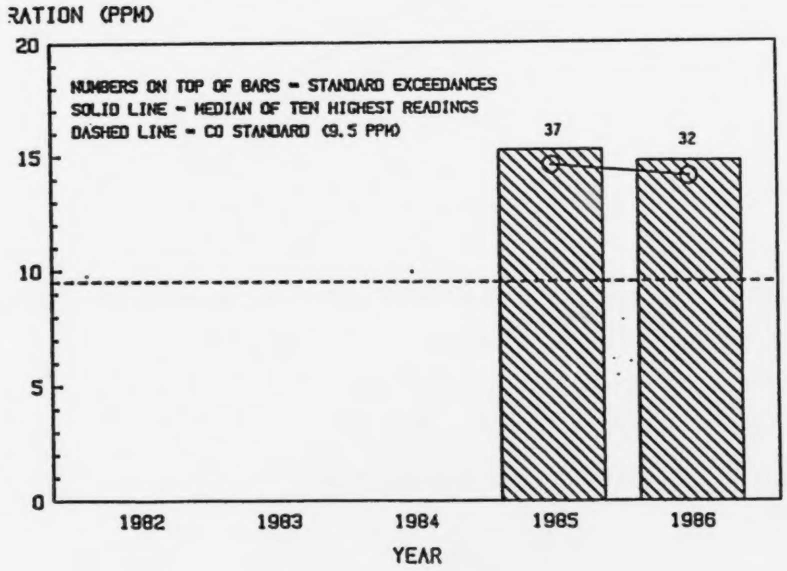
The national ambient air quality standard for nitrogen dioxide has not been exceeded in Region IO over the past several years. Current monitoring efforts are sustained in order to identify ozone precursors. The Portland/Vancouver district is the only ozone nonattainment area in Region 10.

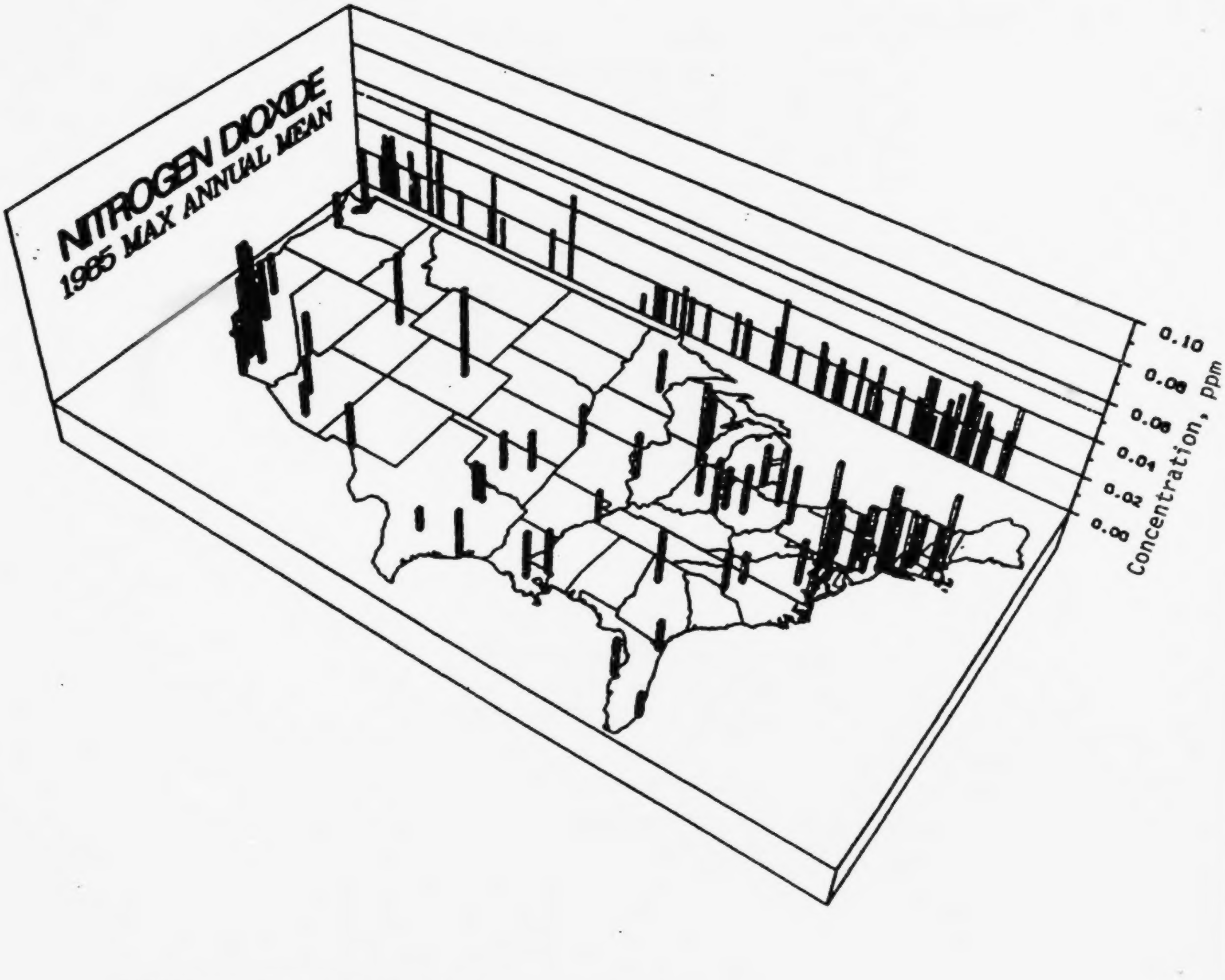
Nitrogen dioxide has not been a regional priority—in fact, Region 10 is encouraging Headquarters to consider reducing ambient monitoring of NO_2 in order to better support other criteria pollutant programs. There is only one $N0_2$ nonattainment area in the country and that is the Los Angeles basin.

1986 AIR QUALITY DATA ANALYSIS
SPENARD & BENSON - ANCHORAGE, ALASKA
8-HR SECOND MAXIMUM CO READINGS



1986 AIR QUALITY DATA ANALYSIS
FEDERAL BUILDING - FAIRBANKS, ALASKA
8-HR SECOND MAXIMUM CO READINGS




NITROGEN DIOXIDE
1985 MAX ANNUAL MEAN
0.10
0.08
0.06
0.04
0.02
0.00
Concentration, ppm

United States map of the highest annual arithmetic mean nitrogen dioxide concentration by metropolitan statistical area, 1985.
Seattle 1985 highest concentration -- .034 ppm
Portland 1985 highest concentration -- .018 ppm

Source: National Air Quality Trends Report, 1985.

Carbon Monoxide (CO)

Environmental Indicators/Program Status

Carbon monoxide concentrations are evaluated in various ways. The severity of a CO problem is measured by both the magnitude of the second-highest concentration for a given year at a given monitor and the frequency with which the area violates the standard. EPA allows the highest recorded CO concentration to be disregarded to account for "flukes," but allows no subsequent violations. A nonattainment area must provide data from eight consecutive quarters in order to demonstrate attainment.

Regionally, the CO problem can be evaluated by comparing the number of locations with healthful CO levels to the number of designated nonattainment areas. Region 10 currently has twelve areas which do not regularly attain the national standard. Violations generally occur during the winter season, when colder temperatures cause vehicles to burn fuel less efficiently, and weather inversions cause emissions to concentrate close to ground level. The improvements in these areas are due for the most part, to the implementation of control measures, as well as an influx of cleaner burning automobiles due to the Federal Motor Vehicle Emission Control Program (FMVECP).

Because these are measurements taken over a relatively short period of time, these indicators (monitoring data, number of nonattainment areas, operational control measures, etc.) fail to reflect the exceptional events which can exacerbate CO concentrations over time; for example, Seattle has had increased traffic congestion as a result of the construction of its bus tunnel in the downtown area—the temporary increase in traffic intensifies CO concentrations in the area.

Seven areas in Region 10 have CO problems severe enough to warrant a vehicle inspection and maintenance (I/M) program to control automobile emissions. These programs inspect cars to ensure that only well-tuned and properly operating vehicles drive in nonattainment areas. These programs have helped to achieve significant reductions in CO concentrations.

The following is a brief description of Region IO's CO nonattainment areas.

CARBON MONOXIDE NONATTAINMENT AREA CONTROL STRATEGIES

Area	Attainment Plans Submitted?	Attainment Plans Approved?	I/M Start-up date	Anti-tampering*	Other Strategies**
Anchorage, AK	yes	yes	July, 1985	yes	FMVECP,TCMs
Fairbanks, AK	yes	yes	July, 1985	yes	FMVECP, TCMs
Boise, ID	yes	yes	August, 1984	yes	FMVECP, TCMs
Seattle, WA	yes	yes	July, 1982	no	FMVECP, TCMs
Spokane, WA	yes	yes	July, 1985	no	FMVECP, TCMs
Tacoma, WA	yes	yes	no	no	FMVECP,TCMs
Yakima, WA	yes	yes	no	no	FMVECP, TCMs
Eugene, OR	yes	yes	no	no	FMVECP, TCMs
Grants Pass, OR	yes	yes	no	no	FMVECP, construction of 3rd bridge over river
Medford, OR	yes	yes	January, 1985	yes	FMVECP, TCMs
Portland, OR	yes	yes	July, 1975	yes	FMVECP, TCMs
Salem, OR	yes	yes	no	no	FMVECP, TCMs

* Anti-tampering check conducted during I/M inspection

** FMVECP=Federal Motor Vehicle Emission Control Program; TCMs=Transportation Control Measures

Washington Nonattainment Areas

Seattle, Spokane, Tacoma, and Yakima

Seattle's CO problem is made up of four smaller area "hot spots" specifically in Bellevue, the University District, the downtown Central Business District, and the Rainier Avenue/ Dearborn corridor. A centralized I/M program was begun in 1982; however, due to various circumstances such as meteorological conditions and major construction activity, Seattle has not achieved the CO standard.

Spokane's I/M program has produced excellent results for the city's air quality. Unfortunately, the monitoring data does reflect areas within the nonattainment boundary which record markedly higher concentrations than the other monitors (i.e., the Hamilton/Sharp Street monitor). Although Spokane will not attain by the December 31, 1987 deadline, it is projected that with a revised CO plan, attainment will be achieved in the near future. Tacoma and Yakima continue to fluctuate just above and below the standard. Projections indicate that neither city will attain by the December, 1987, deadline; however, with updated CO plans, compliance can be achieved.

Oregon Nonattainment Areas

Eugene, Portland, Grants Pass, Medford, Salem

Carbon monoxide trends have decreased in Oregon, as they have in Washington. Portland has had an I/M program since 1975, and has not recorded a violation of the standard since 1985. Eugene, Oregon generally measures concentrations of CO below the 9.0 ppm standard; state and local officials are currently working on a redesignation request to attainment for Eugene. Carbon monoxide levels in Medford have also declined. Since Oregon I/M programs are biennial, the full benefits of its I/M program may not be realized until the end of 1987.

Grant's Pass, Oregon was designated nonattainment in 1985; EPA has approved their CO control plan, and projections show that Grants Pass will attain the standard by December, 1990.

Idaho Nonattainment Area

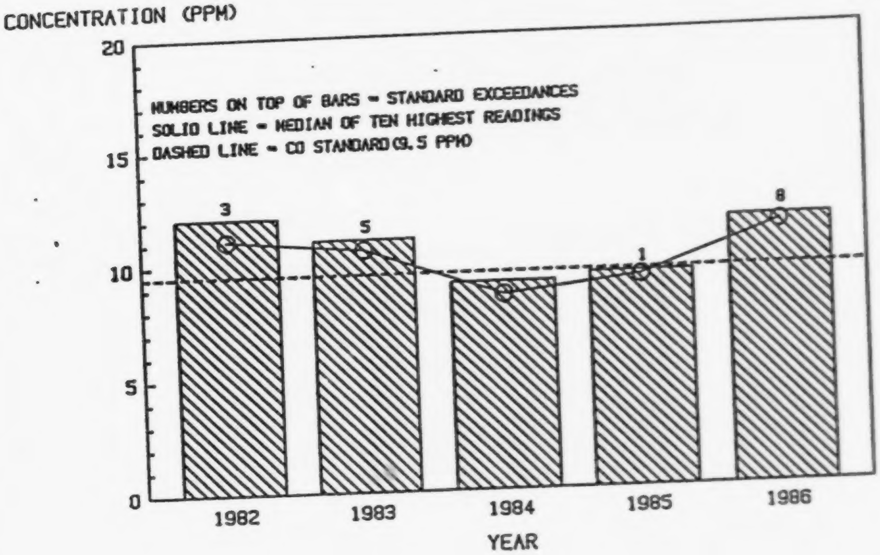
Boise is the only CO nonattainment area in Idaho. Monitoring indicates that Boise is very close to meeting the standard, possibly within a year. The I/M program in Boise will continue through March, 1990.

Alaska Nonattainment Areas

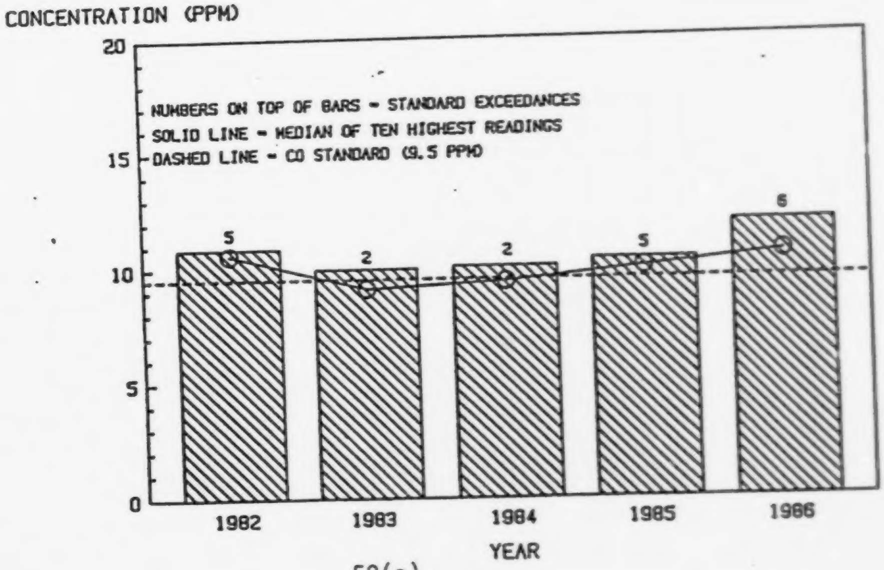
Anchorage and Fairbanks

Alaska's CO problems are the most severe in the region. Because of cold wintertime temperatures, Fairbanks and Anchorage both experience high concentrations of CO. The I/M programs in both cities, initiated in 1985, are two of the most aggressive in the nation. The positive effects on air quality are obvious. Both cities have experienced a decreased CO problem in terms of magnitude, and Anchorage reports less frequent CO problems.

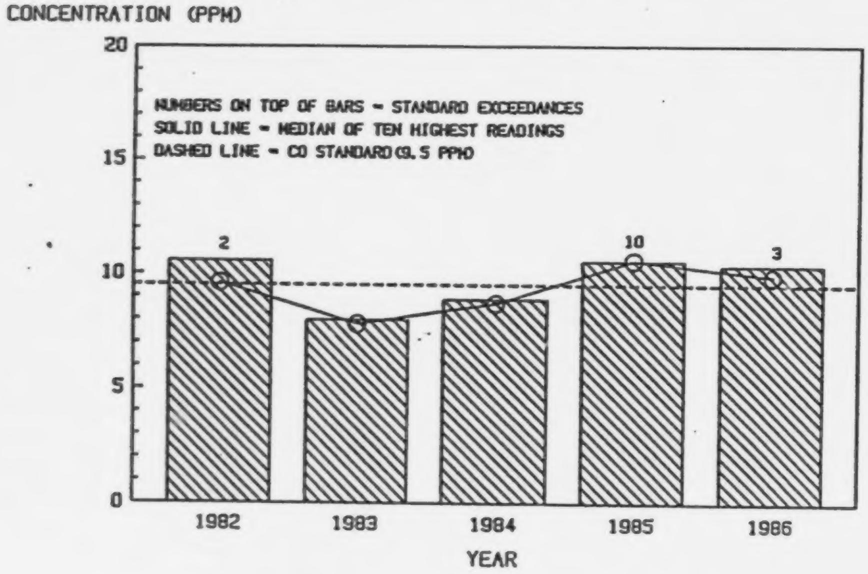
1986 AIR QUALITY ANALYSIS
JAY JACOBS - SEATTLE, WASHINGTON
8-HR SECOND MAXIMUM CO READINGS



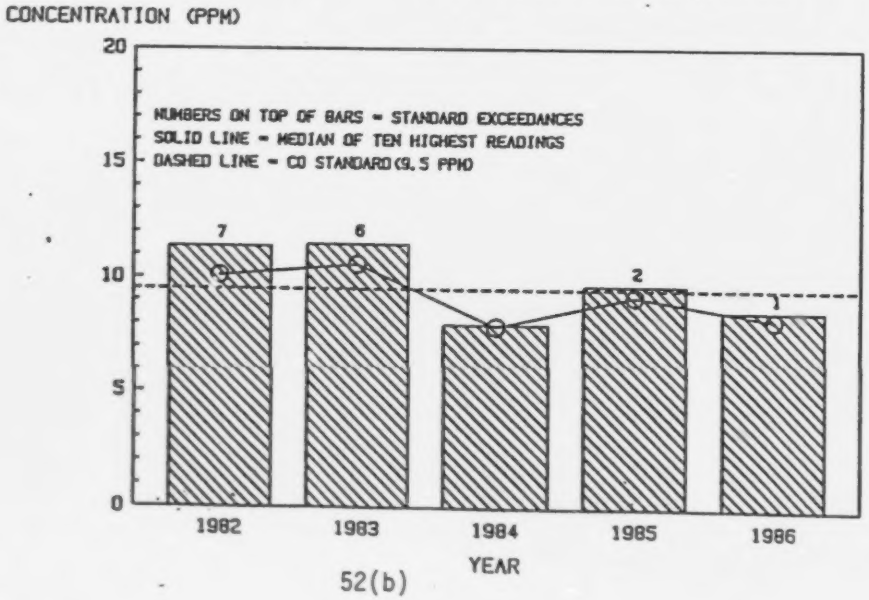
1986 AIR QUALITY ANALYSIS
STURTEVANTS SPORTS - BELLEVUE, WASHINGTON
8-HR SECOND MAXIMUM CO READINGS



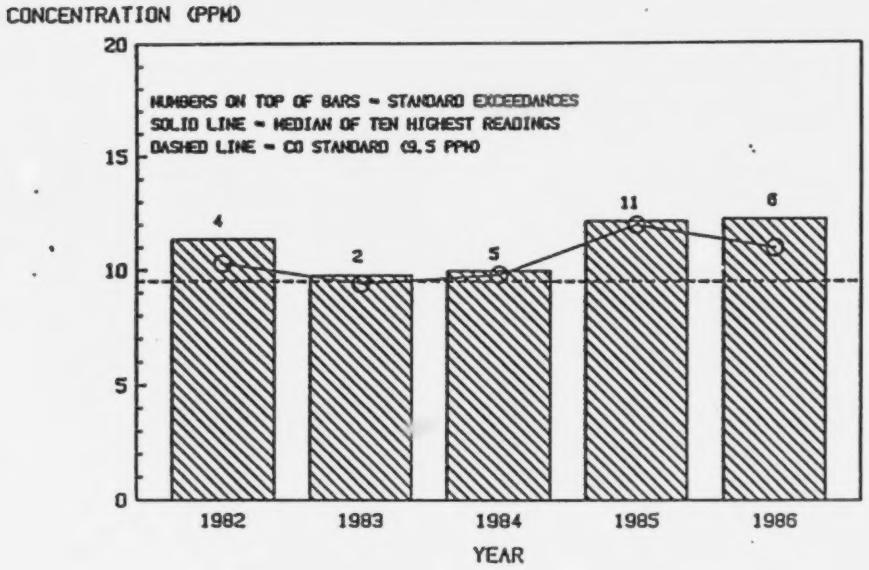
1986 AIR QUALITY ANALYSIS
NORTHGATE APTS - SEATTLE, WASHINGTON
8-HR SECOND MAXIMUM CO READINGS



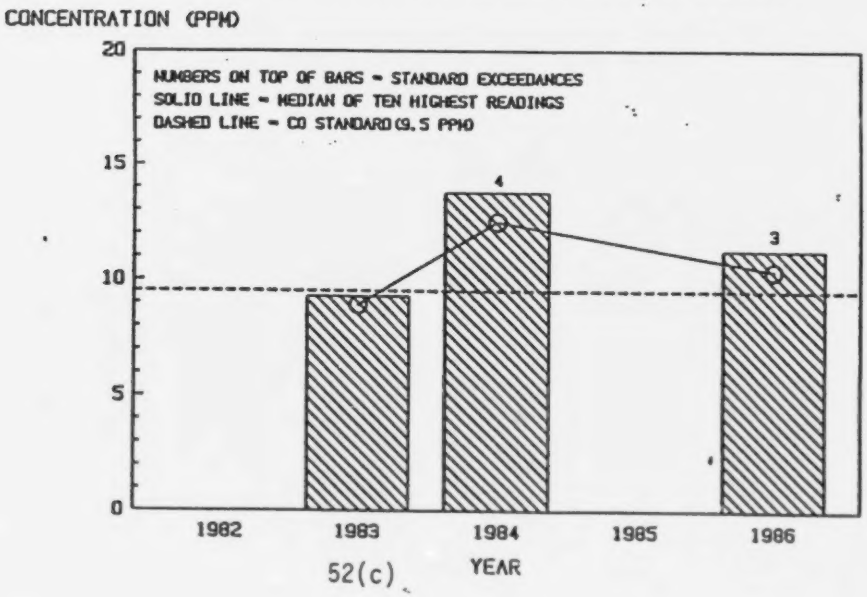
1986 AIR QUALITY ANALYSIS
4TH & PIKE BLDG - SEATTLE, WASHINGTON
8-HR SECOND MAXIMUM CO READINGS



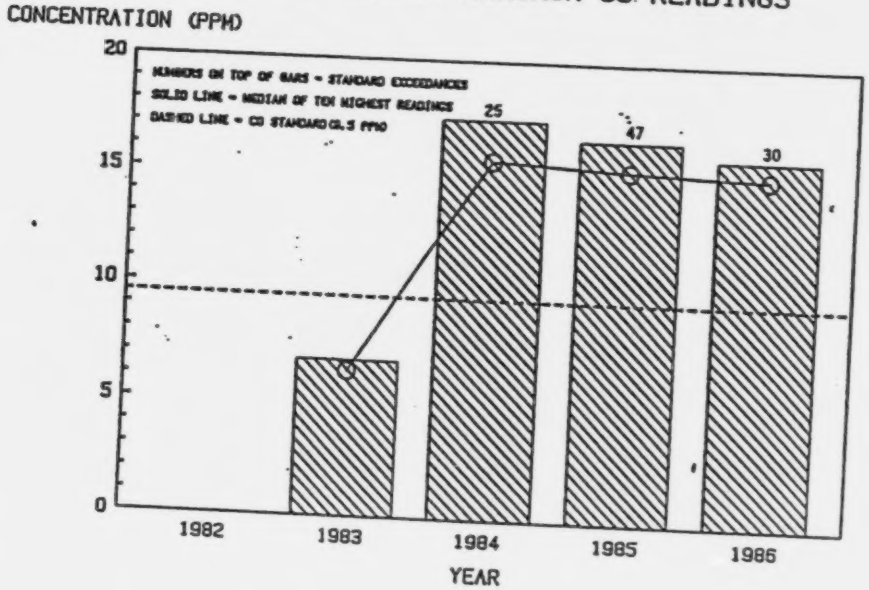
1986 AIR QUALITY ANALYSIS
PLAZA PARKING GARAGE - TACOMA, WASHINGTON
8-HR SECOND MAXIMUM CO READINGS



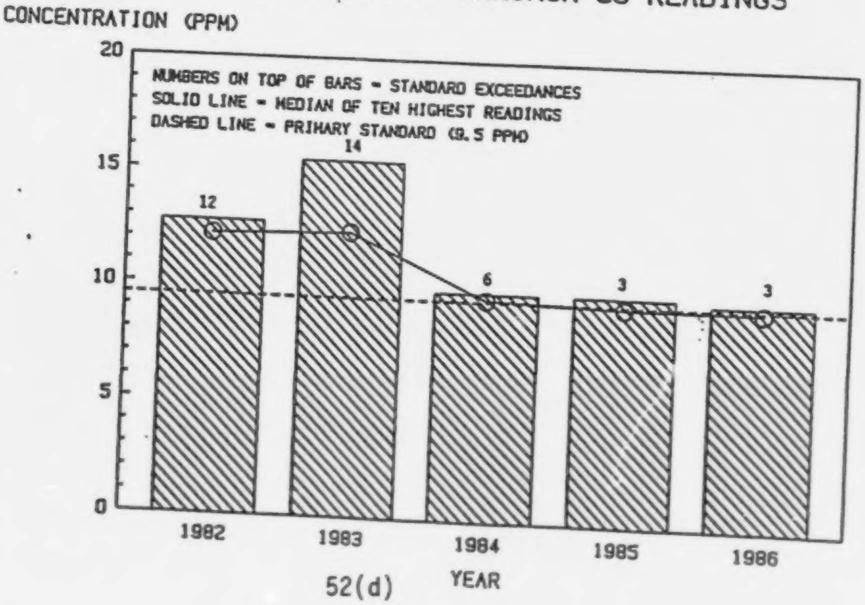
1986 AIR QUALITY ANALYSIS
YAKIMA & 2ND ST. - YAKIMA, WASHINGTON
8-HR SECOND MAXIMUM CO READINGS



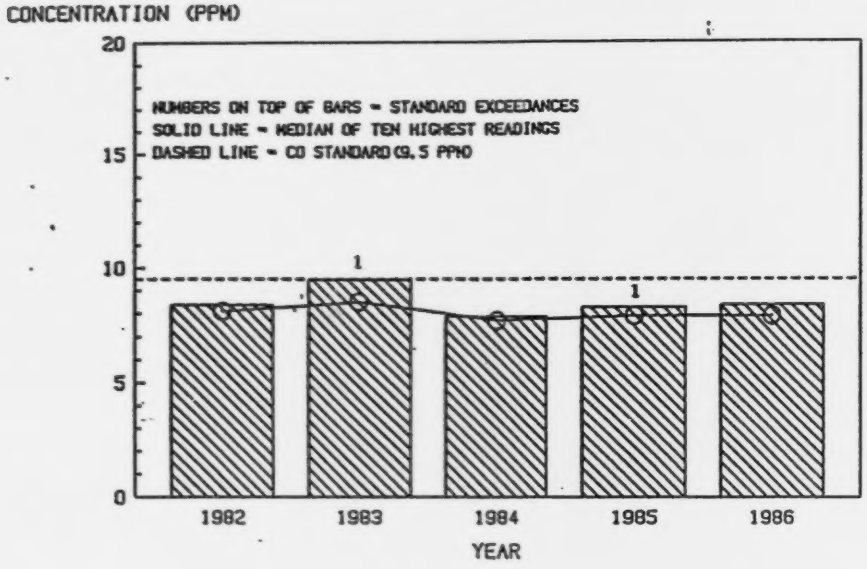
1986 AIR QUALITY ANALYSIS
HAMILTON ST. - SPOKANE, WASHINGTON
8-HR SECOND MAXIMUM CO READINGS



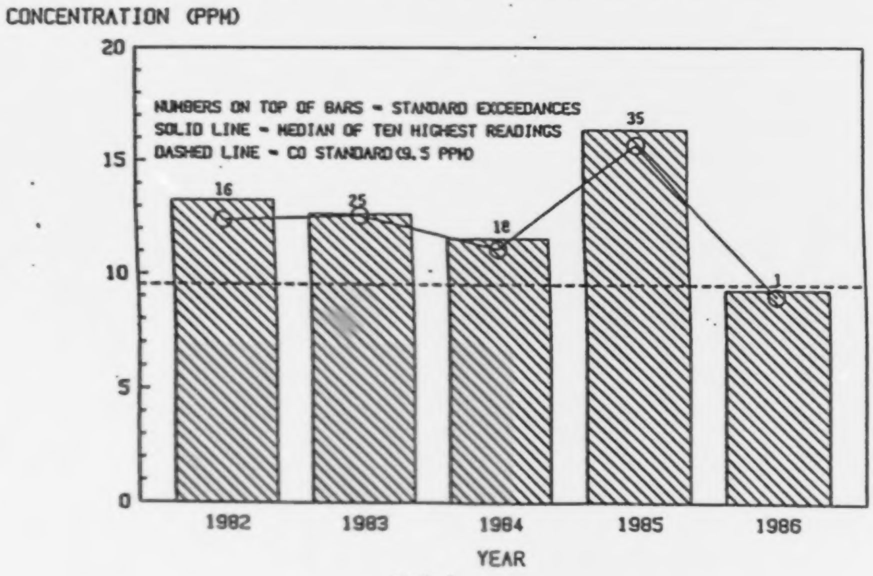
1986 AIR QUALITY DATA ANALYSIS
ODD FELLOWS BLDG. - BOISE, IDAHO
8-HR SECOND MAXIMUM CO READINGS



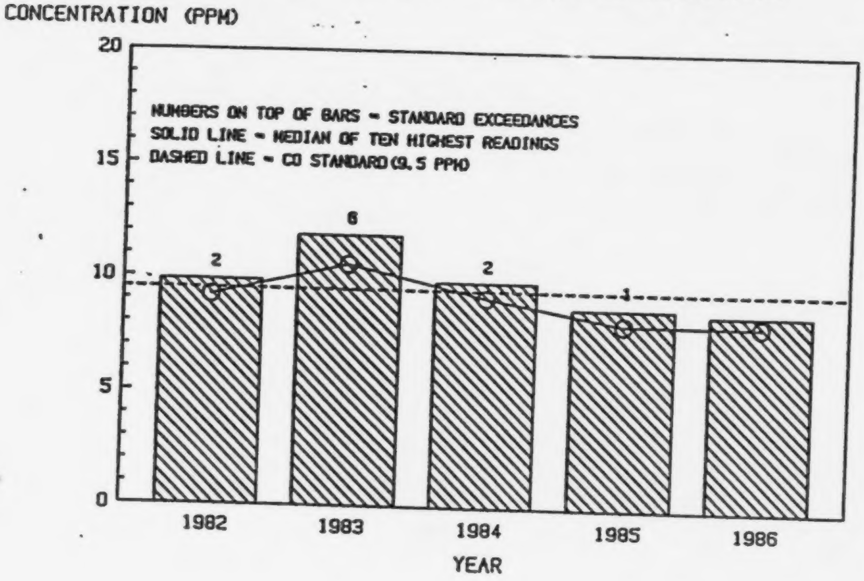
1986 AIR QUALITY ANALYSIS
LANE COMMUNITY - EUGENE, OREGON
8-HR SECOND MAXIMUM CO READINGS



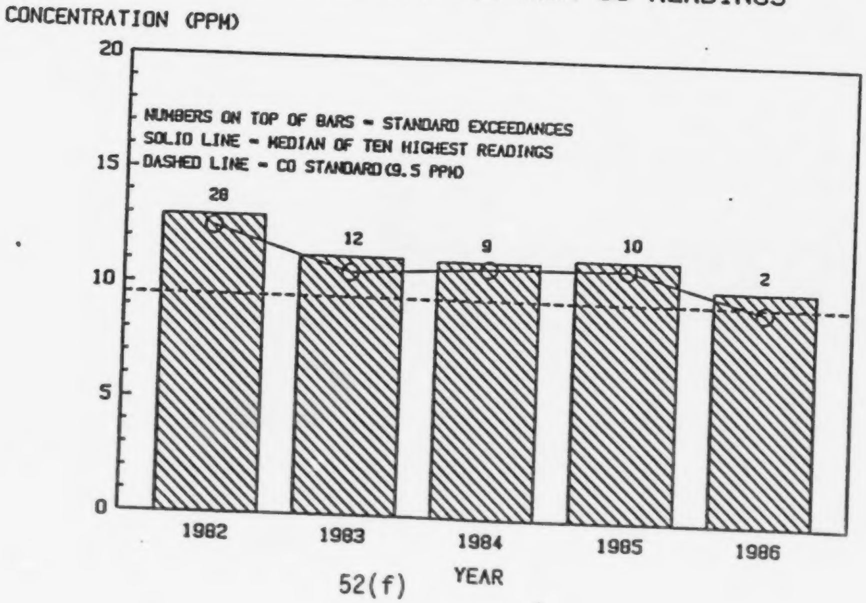
1986 AIR QUALITY ANALYSIS
BROPHY BLDG - MEDFORD, OREGON
8-HR SECOND MAXIMUM CO READINGS



1986 AIR QUALITY ANALYSIS
NEWBERRY COMPANY - PORTLAND, OREGON
8-HR SECOND MAXIMUM CO READINGS



1986 AIR QUALITY ANALYSIS
WING BUILDING - GRANTS PASS, OREGON
8-HR SECOND MAXIMUM CO READINGS



Ozone

Ozone is produced in the atmosphere when nitrogen oxides and volatile organic compounds (VOCs) are exposed to sunlight. Auto exhaust and stationary source hydrocarbon combustion are the primary sources of nitrogen emissions. Auto exhaust, petrochemical industries, and the use of solvents in manufacturing are the primary sources of VOCs. Ozone levels are usually the highest about eight hours transport time (approximately 25 miles) downwind of the center of an urban area. Ozone impairs the normal function of the lung. People with chronic respiratory problems seem most sensitive to ozone.

Environmental Indicators

There are two different environmental indicators for ozone. First, by looking at the latest three years of monitoring data, the number of expected exceedances can be calculated—if that number is less than or equal to one, the area qualifies as being in attainment. Second, by tracking the emissions of VOCs, contributing sources can be pinpointed and controlled on an individual or group basis.

Region 10 has only one ozone nonattainment area—the Portland, OR/Vancouver, WA interstate area. Because of multiple exceedances of the standard in 1984, 1985 and 1986, it is not likely that the standard will be met by the statutory deadline of December 31, 1987.

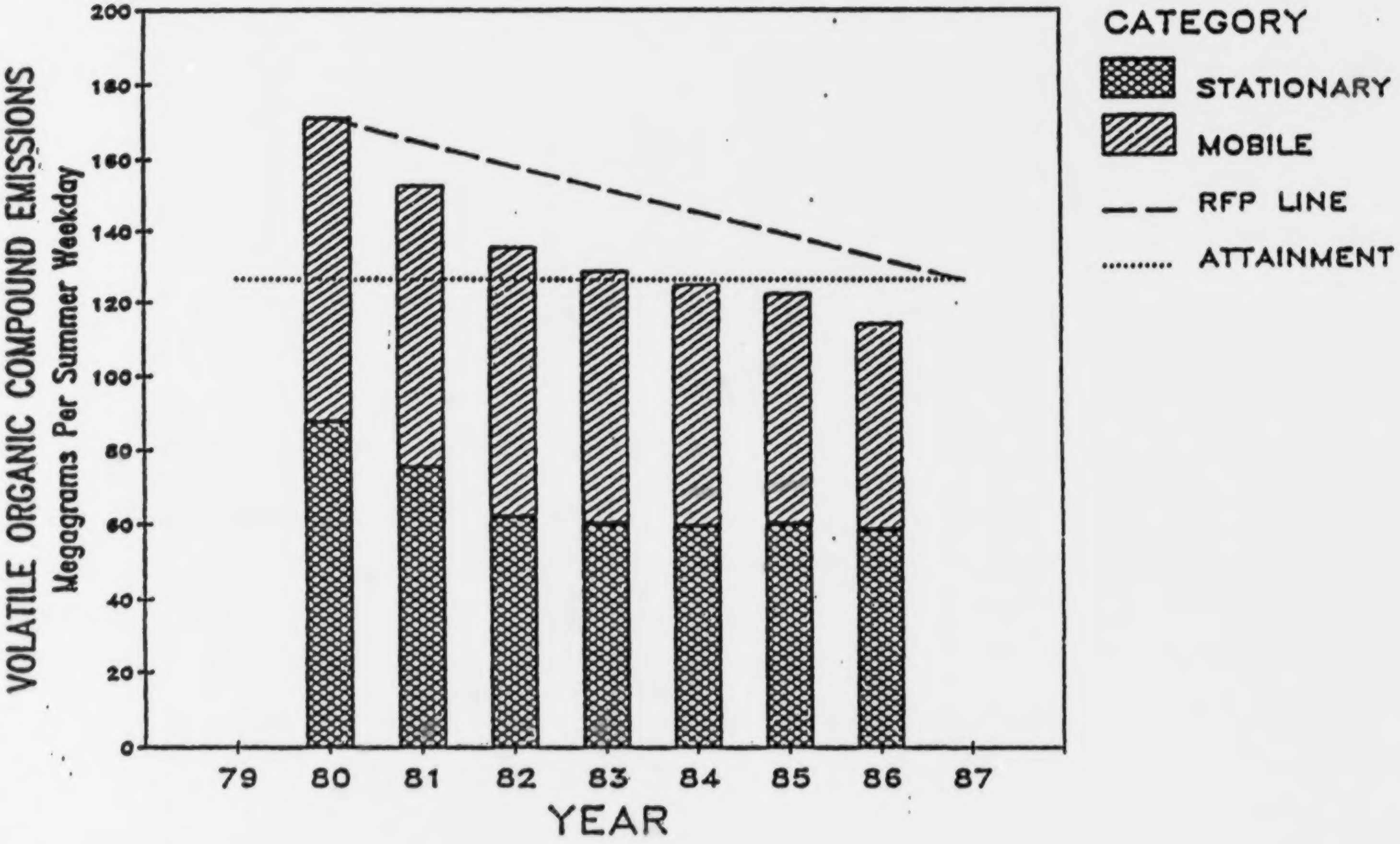
The State of Oregon has recently revised the volatile organic compound regulations for the Portland portion of the nonattainment area, and these revisions reflect a relaxation of the rules. EPA's proposed post 1987 ozone strategy would preclude the approval of rule relaxations in areas which failed to attain the ozone standard by December 31, 1987.

A special study is being done during the summer of 1987. Ambient ozone monitoring was increased from two sites to five sites and an additional ambient VOC and nitrogen oxides site was established. The additional data will be evaluated to determine the extent and severity of the ozone problem.

Figure 5

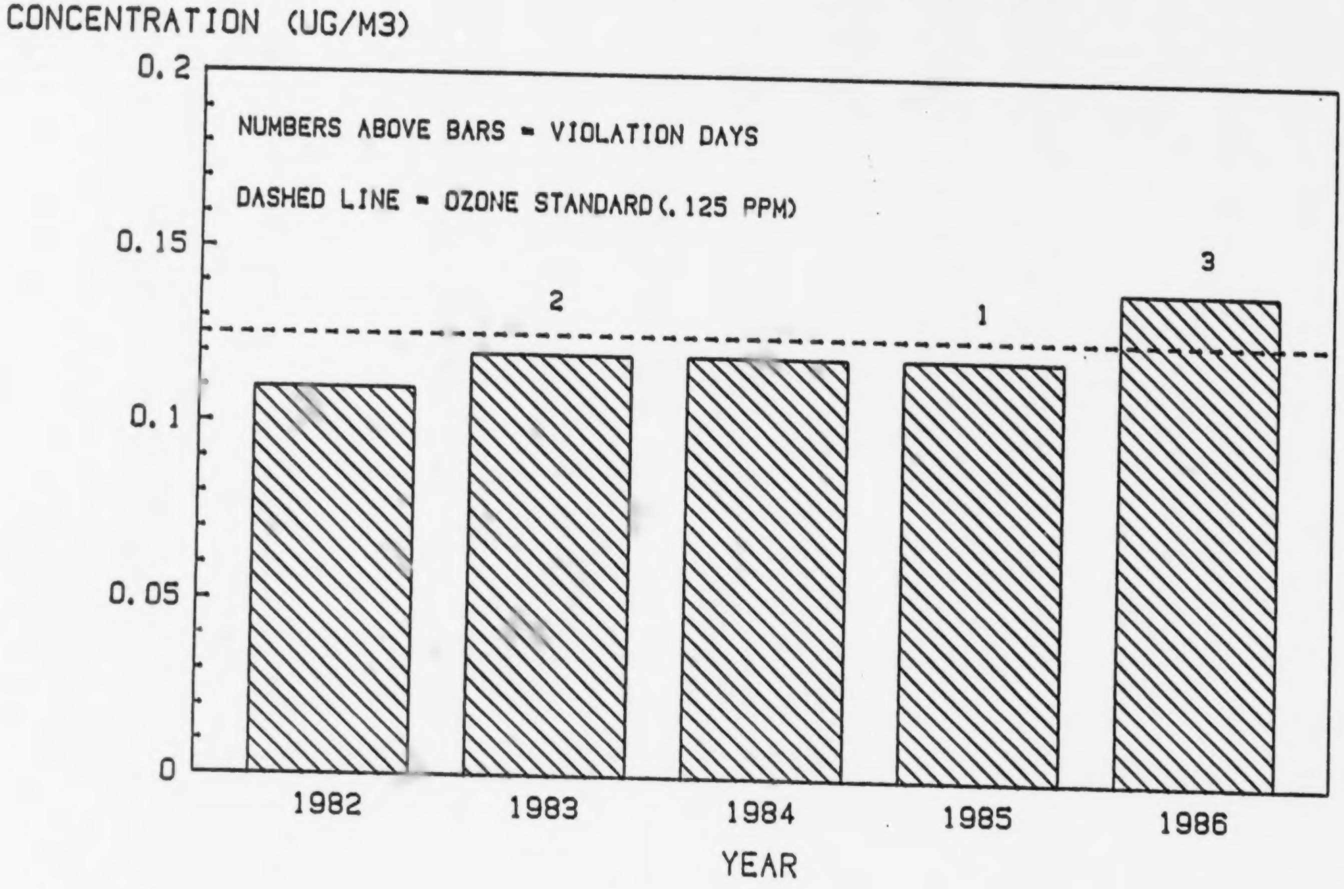
OZONE PRECURSORS EMISSION TREND

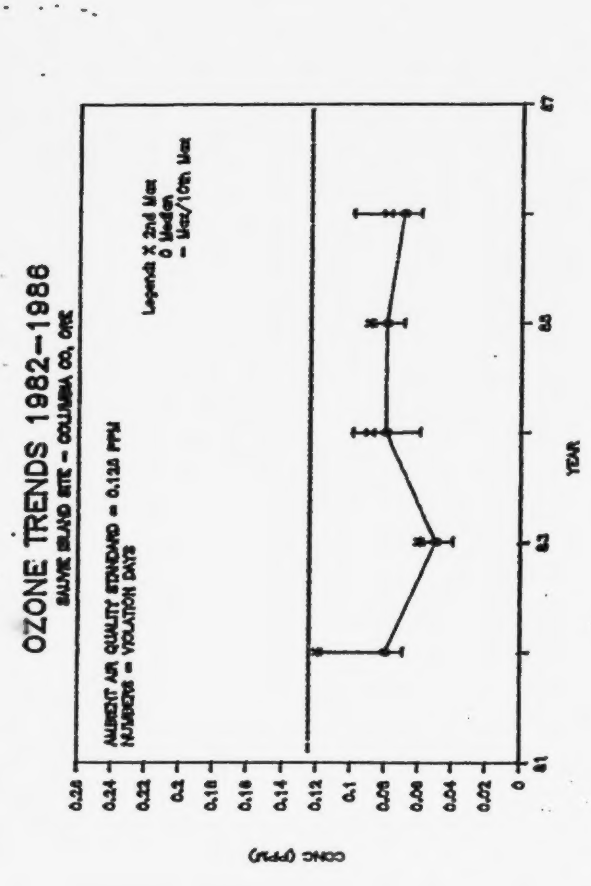
Portland—Vancouver AQMA (Oregon Portion)

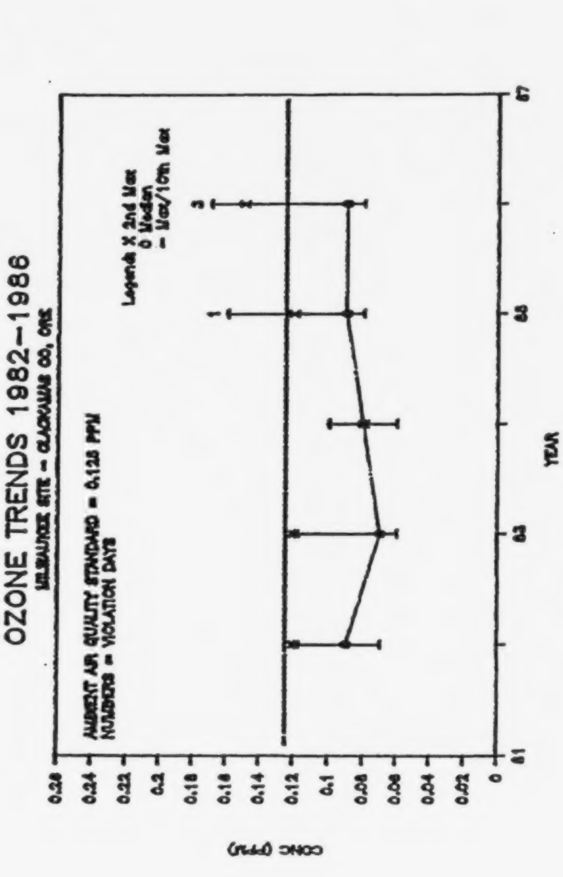


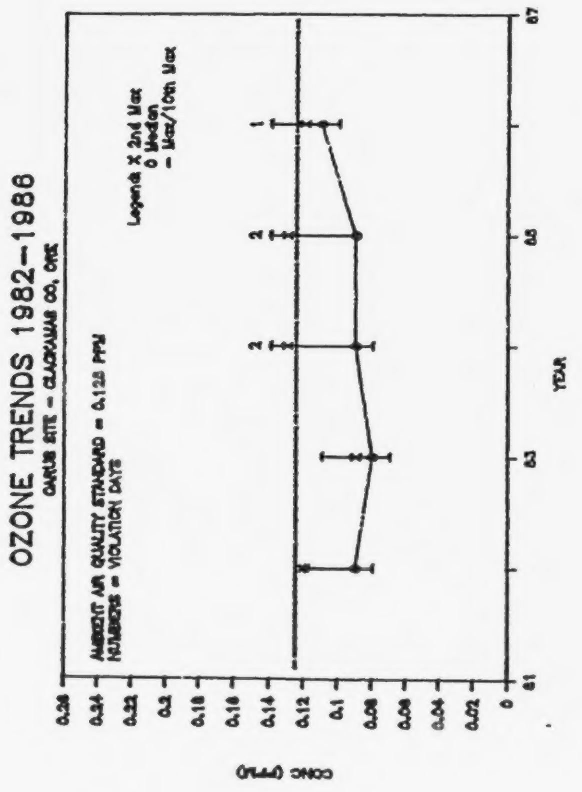
Source: 1986 State of Oregon Reasonable Further Progress Report

1986 AIR QUALITY ANALYSIS
HIGH SCHOOL - MILWAUKIE, OREGON
OZONE DESIGN VALUES




OZONE TRENDS 1982–1986
SAUVIE ISLAND SITE – COLUMBIA CO, ORE
AMBIENT AIR QUALITY STANDARD = 0.125 PPM
NUMBERS = VIOLATION DAYS
Legend: X 2nd Max
0 Median
– Max/10th Max
CONC (PPM)
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
YEAR
81
83
85
87


OZONE TRENDS 1982–1986
MILWAUKIE SITE – CLACKAMAS CO, ORE
AMBIENT AIR QUALITY STANDARD = 0.125 PPM
NUMBERS = VIOLATION DAYS
Legend: X 2nd Max
0 Median
– Max/10th Max
1
3
CONC (PPM)
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
YEAR
81
83
85
87


OZONE TRENDS 1982–1986
CARUS SITE – CLACKAMAS CO, ORE
AMBIENT AIR QUALITY STANDARD = 0.125 PPM
NUMBERS = VIOLATION DAYS
Legend: X 2nd Max
0 Median
– Max/10th Max
2
2
1
CONC (PPM)
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
YEAR
81
83
85
87

Lead

Lead emissions are generated primarily by automobile exhaust and stationary sources such as nonferrous smelters. Federal programs to reduce the amount of lead in gasoline have greatly reduced the amount of lead released into the air.

Environmental Indicator

The environmental indicator for lead is the ambient measure of the quarterly mean lead concentration. Air lead levels in Region 10 have rarely exceeded national standards in the last year. Since this pollutant is regulated under Section IIO of the Clean Air Act, areas violating the national ambient air quality standards (NAAQS) are not only designated nonattainment, but must have State Implementation Plans (SIPs) which demonstrate attainment and maintenance of the NAAQS within three years of promulgation of the standard (October 5, 1978). All four states in Region 10 have acceptable lead SIPs.

The meaningfulness of this indicator is limited in that inhalation is only one route of human uptake. Another route is ingestion of airborne lead, which is extremely difficult to estimate and not addressed by EPA.

There have been no violations of the lead standard in the last three years in Seattle; in fact, ambient air lead levels have decreased 97% between 1983 and 1986. In Portland, ambient levels decreased 75%. The closure of primary nonferrous smelters (Bunker Hill in Silver Valley, ID, and ASARCO in Tacoma, WA) and secondary lead smelters (Quemetco in Seattle, WA and Bergsoe in Portland, OR) have resulted in significant improvements to air quality in these areas.

LEAD

ENVIRONMENTAL INDICATORS:

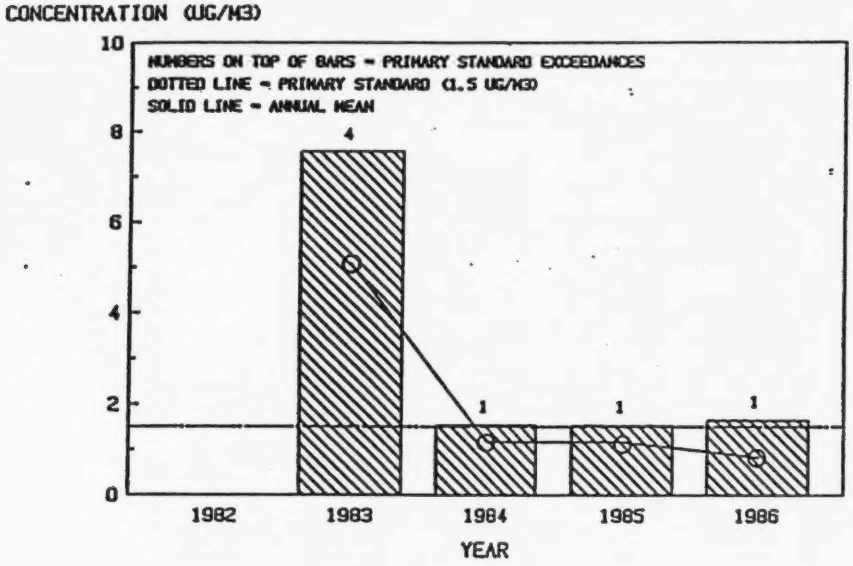
*SHUTDOWN of major sources
  ASARCO, Tacoma, WA
  BUNKER HILL, Silver Valley, ID
  QUEMETCO, Seattle, WA
  BERGSOE, Portland, OR

*FEDERAL REGULATIONS to reduce lead in gasoline

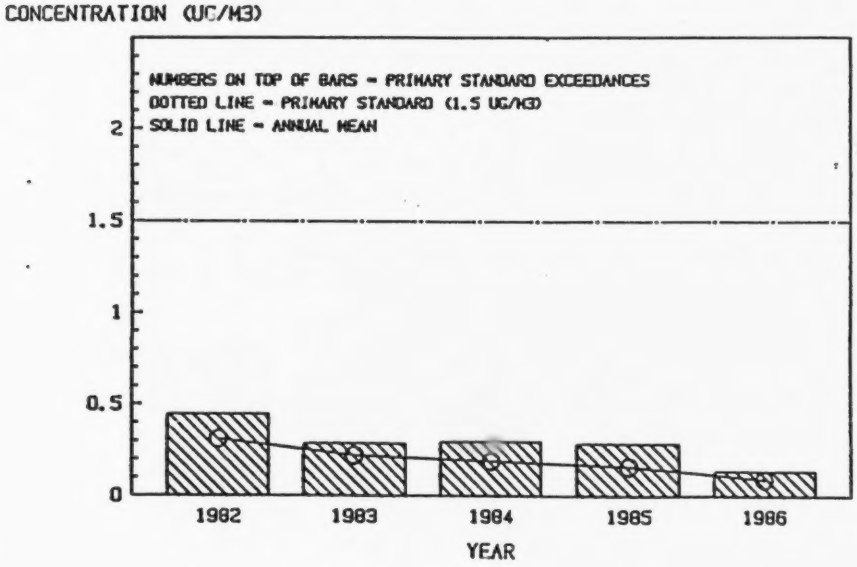
*FEDERAL REGULATIONS to remove lead from paint

*EDUCATIONAL PROGRAM for contractors for removal of lead based paint in homes

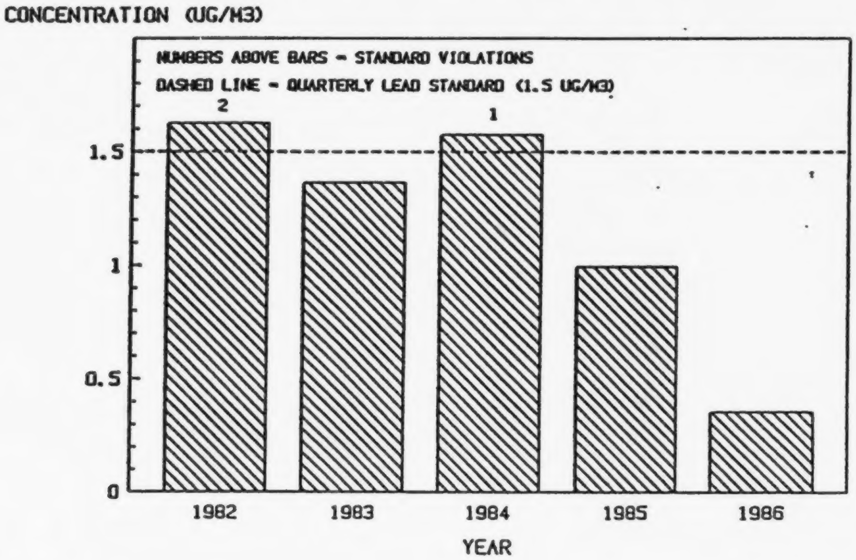
1986 AIR QUALITY ANALYSIS
HARBOR ISLAND TEXACO - SEATTLE. WASHOINGTON
MAXIMUM QUARTERLY MEANS - LEAD



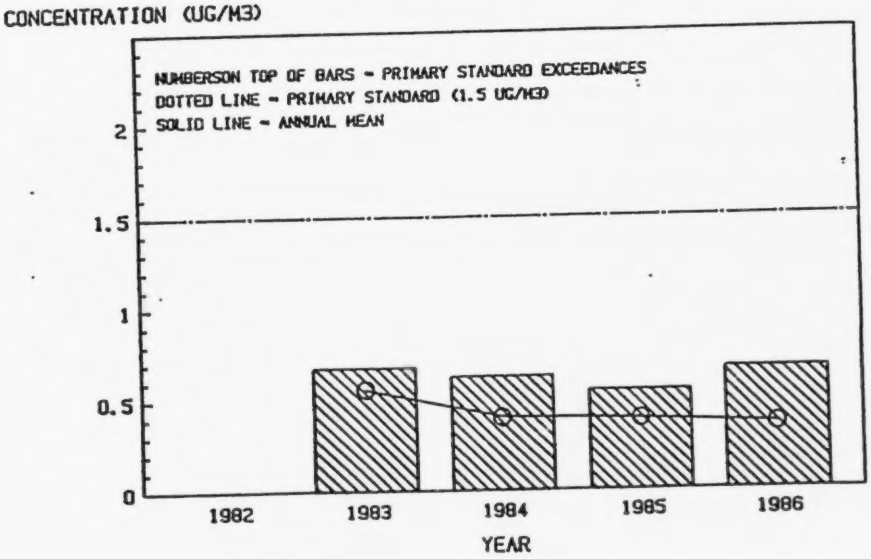
1986 AIR QUALITY ANALYSIS
N 98TH & STONE AVE N - SEATTLE. WASHINGTON
MAXIMUM QUARTERLY MEANS - LEAD

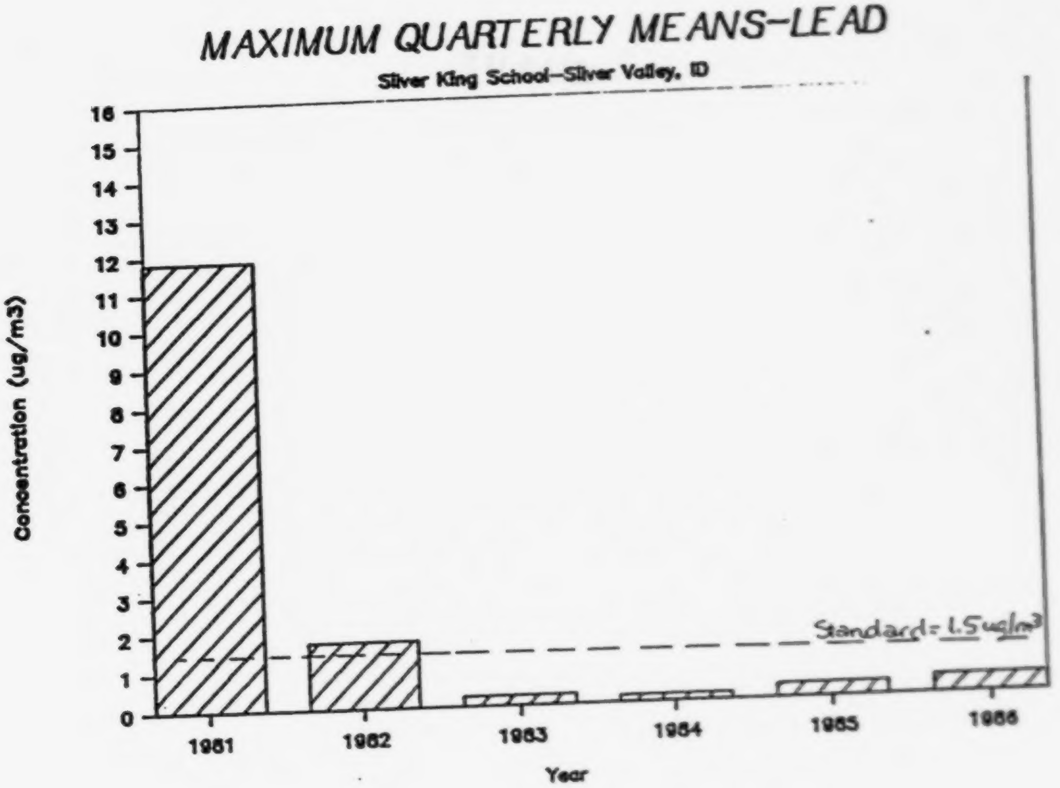


1986 AIR QUALITY ANALYSIS
I-5 AND FAILING ST - PORTLAND, OREGON
MAXIMUM QUARTERLY MEANS - LEAD



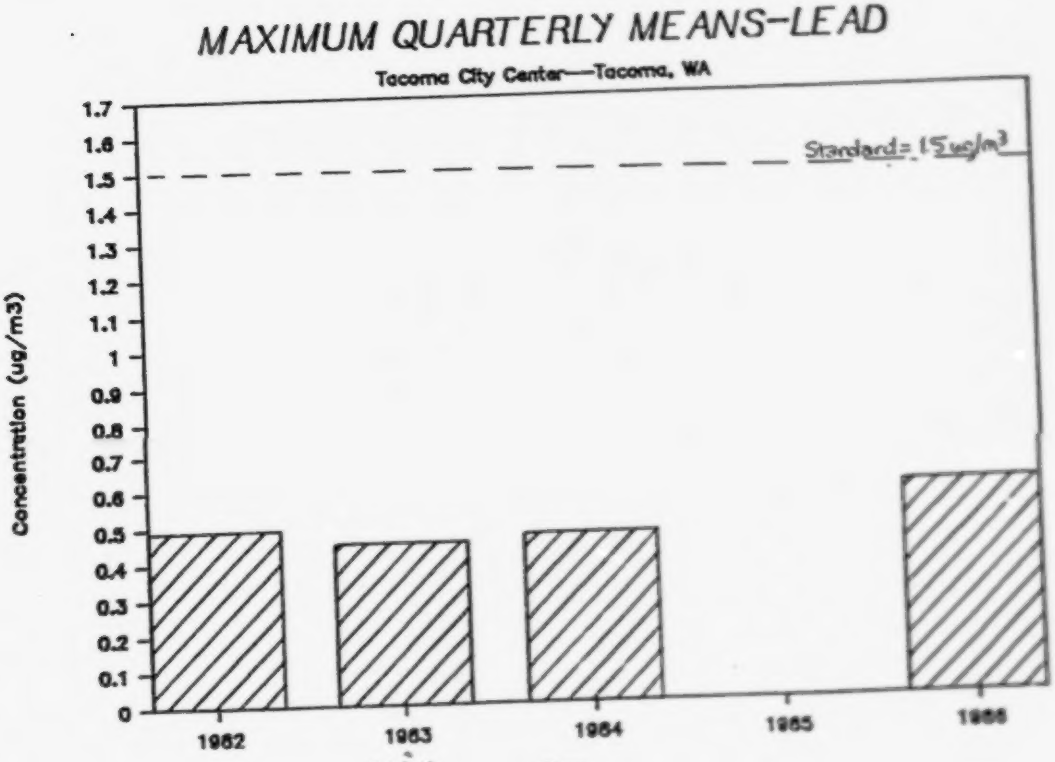
1986 AIR QUALITY ANALYSIS
HARBOR ISLAND - SEATTLE, WASHINGTON
MAXIMUM QUARTERLY MEANS - LEAD





MAXIMUM QUARTERLY MEANS–LEAD

Silver King School–Silver Valley, ID



MAXIMUM QUARTERLY MEANS–LEAD

Tacoma City Center—Tacoma, WA

Sulfur Dioxide

Environmental Indicators

The environmental indicators for SO_2 are the monitoring of "second highest 24 hour averages", and "the annual mean concentrations". These measurements are sufficient to characterize the problem; they don't however, reflect short term exposures.

Region 10 has a number of sources of SO_2 emissions. Recently, the region has identified two major problem areas, and controls will be required for a pulp mill in Cosmopolis, WA, and for a phosphate fertilizer plant in Pocatello, ID, to reduce emissions. Controls are also being evaluated for a plant in Conda, ID to eliminate violations which have been monitored in that area. The present monitoring system indicates that all areas are currently meeting the ambient air quality standards. In order to determine whether these sources and areas are, in fact, in compliance with emission limits and air quality standards, compliance surveys will be conducted at the major sources of SO_2 and monitoring studies done in selected geographic areas. These studies will take place throughout 1987 and will focus on the following sources and areas:

- a power plant in Centralia, WA
- two refineries in Anacortes, WA
- monitoring studies in Longview-Kelso, WA; Cherry Point, WA, and possibly in Sitka-Ketchikan, Alaska

SULFUR DIOXIDE

Proposed actions for reducing ambient SO_2 concentrations:

Sources identified throughout Region

Cosmopolis, WA

Pocatello, ID

Conda, ID

Compliance surveys planned in:

Centralia, WA

Anacortes, WA

Longview/Kelso, WA

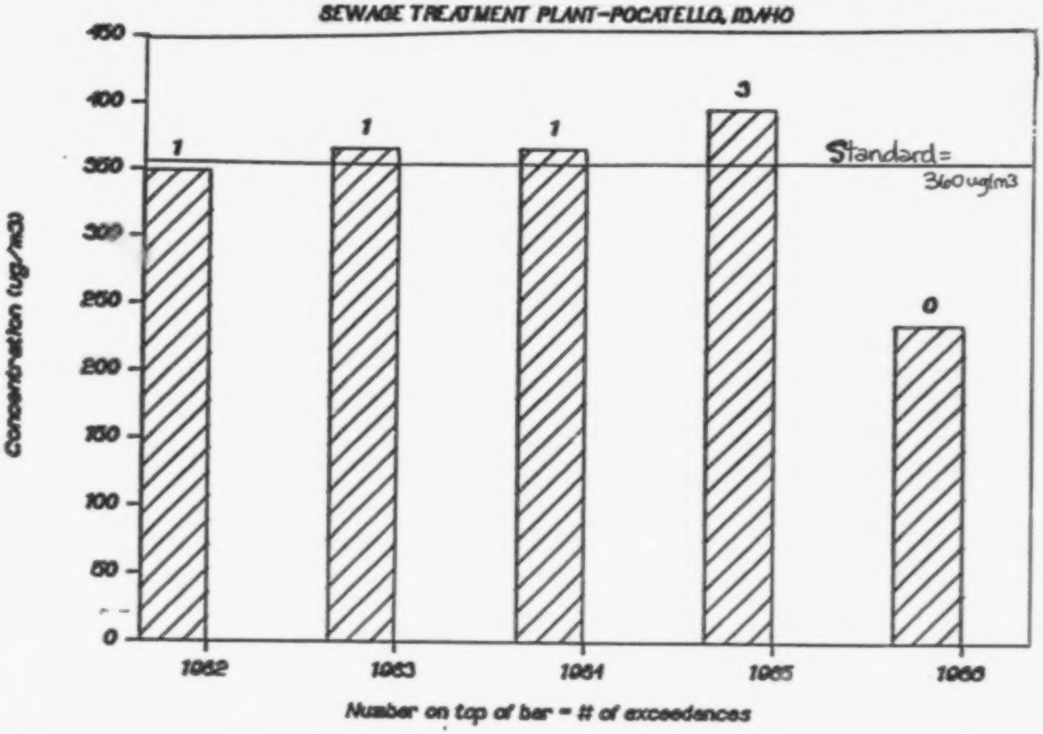
Cherry Point, WA

Eugene/Springfield, OR

Sitka/Ketchikan, AK

1986 SO2 READINGS-24 HR 2nd MAX

SEWAGE TREATMENT PLANT-POCATELLO, IDAHO



Air Toxics

Environmental Indicators

While ambient monitoring data is routinely available for "Criteria Air Pollutants", it is not for "Toxic Air Pollutants". This is due to the cost of collecting samples, the lack of ambient standards for these substances, the large number of substances that could be monitored, and the lack of standard monitoring methods. For these (and other) reasons, environmental indicators used for air toxics must be surrogates for actual environmental measurements.

Since state and local agencies report to EPA their major efforts to control air toxic releases every six months, we have chosen these reports as a means to obtain surrogate measures of environmental results. The table below contains a summary of state and local activities which address point sources of air toxics.

As the table shows, there is a significant amount of activity, particularly in Oregon and Washington, which results in toxics emission control on new and existing air toxics sources. EPA will continue to monitor these activities and add other air toxics environmental indicators as they become available.

Summary of State Air Toxics Activities
For Point Sources
1986

Activity	Number of Sources, by State			
	AK	ID	OR	WA
New Sources				
Sources Evaluated	2	4	4	10
Controls Required	0	2	4	6
Existing Sources				
Sources Evaluated	0	1	6	28
Controls Required	0	0	1	11

Program Status

Region IO's program is based upon the EPA national air toxics strategy ("A Strategy to Reduce Risks to Public Health from Air Toxics." June, 1985). This region's program relies heavily on state initiatives and EPA to provide both technical and limited regulatory support.

The national air toxics strategy has its roots in a 1985 EPA study that demonstrated that past efforts to control common air pollutants like sulfur dioxides and particulates also resulted in significant reductions in toxic gaseous and particulate emissions. This study also estimates that current emissions of air toxics may be responsible for I3OO to I7OO cancer cases annually in the United States. Progress has been made in controlling asbestos and air toxics through the National Emissions Standards for Hazardous Air Pollutants (NESHAP) program. To date, regulations have been developed for arsenic, asbestos, benzene, beryllium, mercury, vinyl chloride, and radionuclides. EPA has placed increased emphasis on the NESHAP program. Approximately 36 pollutants are currently undergoing NESHAP assessment. Limited information exists on the sources, quantities, and effects of toxic air emissions in the Pacific Northwest. This data is now being gathered by the state and local agencies.

Three state agencies and one local agency in Region 10 have hired full-time air toxics coordinators. Alaska has a staff member who works part time on air toxics. Each of these agencies has developed Multi-Year Development P1ans (MYDP) for air toxics. These plans propose activities to take the next three to five years that will reduce public exposure to airborne toxics.

Each MYDP addresses four major issues. First, the plan specifies how the agency will implement the NESHAP regulations that EPA has delegated to them. Second, the plan specifies the approach that will be used to address high risk point sources of air toxics. Third, the MYDP addresses high risk urban sources. They include motor vehicles, the refining and distribution of petroleum products, residential wood stoves, and dry cleaners. Motor vehicle fuels emit varying amounts of benzene and ethylene dibromide, both of which are considered to be carcinogenic. Under certain conditions, the smoke from combustion of residential wood stoves can contain high levels of certain polycyclic organic materials (POM), generally considered to be mutagenic and in some cases carcinogenic.

The last issue addressed by each MYDP is program enhancement. EPA, state, and local agencies are striving to improve their abilities to quantify air toxics risks and to manage those risks.

Asbestos

Asbestos is a naturally occurring mineral fiber which has been used in many household and commercial products. Its unique properties of tensile strength, moldability, as well as its resistance to thermal and corrosive destruction have made it valuable for uses in construction, textile, and plastics industries. However, because of its crystaline structure and friable nature, asbestos poses a tremendous risk to human health. The tiny fibers, when airborne, are easily inhaled and can become lodged in respiratory tissues. Symptoms of asbestos related disease may appear 20 years after the first exposure. Asbestos diseases can progress to incurable stages long before any adverse health effect is detected or diagnosed. As there is no known safe level of exposure, EPA has developed a program of asbestos education and abatement in schools, and maintains a quality assurance program for all abatement projects.

Environmental Indicators

Success or failure in the asbestos program can be measured in a number of ways, some of which are better than others. Measuring accomplishments by the reduction of cancer rates is necessary but not immediately useful, as the results of such studies will not be known for another forty years. Using the number of documented violations as an environmental indicator or measure of success may not give an accurate picture, as the number of reported violations may have little to do with actual exposures. The number of information requests, telephone calls received, and notifications of projects, when compared to enforcement actions taken, is a reliable measure of program productivity, but not neccessarily linked to environmental progress, risk etc. It is important to note that these indicators are not static. It will be necessary for these environmental indicators to be re-evaluated as the program progresses.

Current Program Status

Use of asbestos in products has dropped significantly as a result of EPA's plan under the Toxic Substances Control Act (TSCA) to prohibit the manufacture, importation and processing of asbestos in certain products, and to phase out the use of asbestos in all other products. The decline of asbestos in products is being helped along as new materials are developed to replace asbestos, and by the fact that insurance companies have begun placing liability insurance on those products which still contain asbestos.

Companies which manufacture such products are to be inspected under regulations set forth by the National Emission Standards for Hazardous Air Pollutants (NESHAP) program; at this time, not all sources are being adequately inspected. In Region 10, both Washington and Oregon have the delegated authority to oversee the inspection requirements of the NESHAP regulations. Alaska has recently requested partial authority, and the Idaho plan is still in the development stage. It is hoped that appropriate inspections will be made and the regulations fully enforced in all four Region 10 states in the near future.

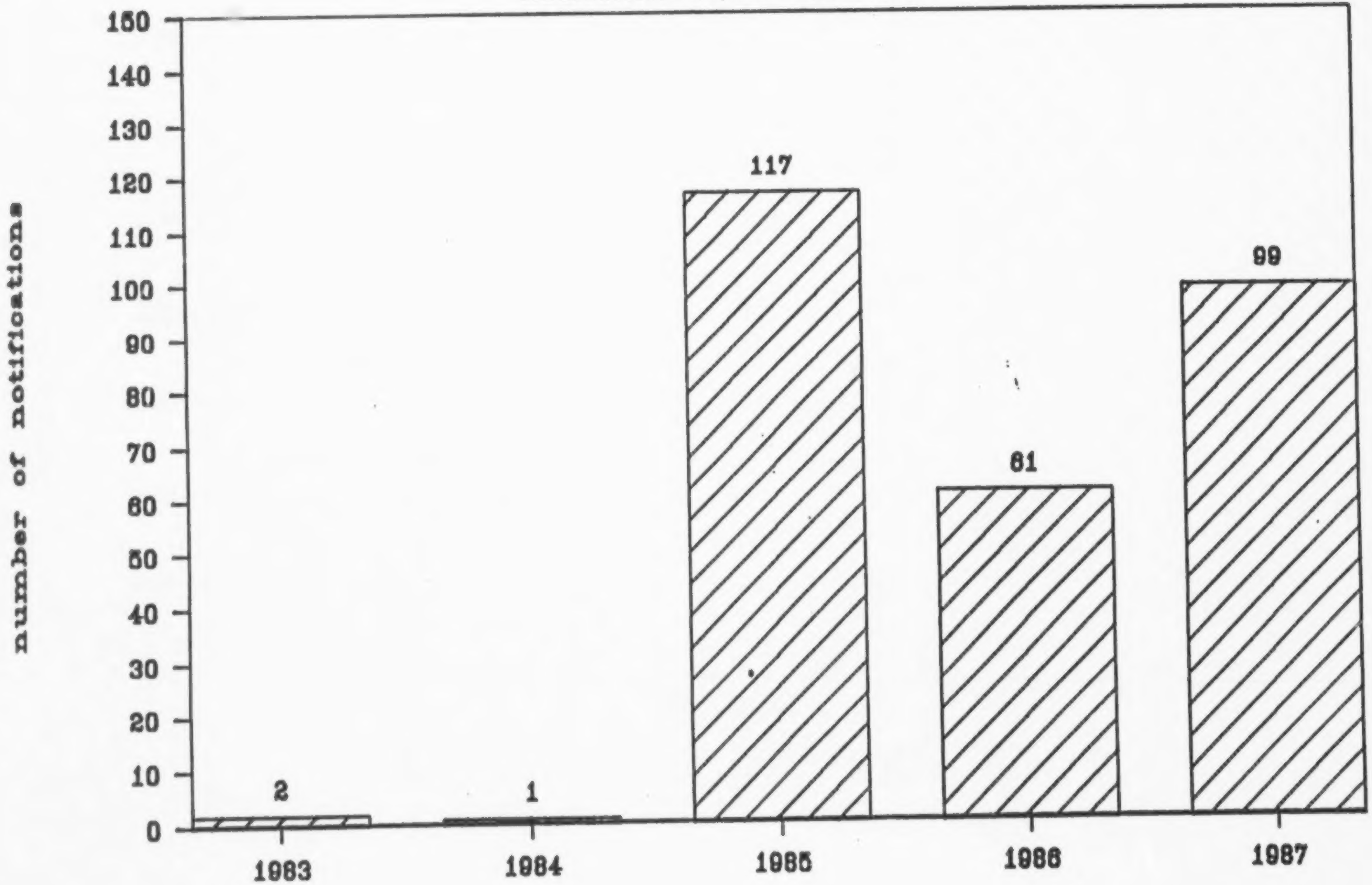
In an effort to truly increase the effectiveness of the asbestos NESHAP enforcement programs among the regional, state, and local offices, EPA headquarters developed the Performance Improvement Project (PIP) in 1985. This project was an effort by the three levels of government to provide increased access to information and instruction, as well as increased visibility of the program. It also produced a significant rise in the number of project notifications received and the number of violations found. For example, in the second quarter of 1985, the Puget Sound Air Pollution Control Authority (PSAPCA) received 51 notifications of renovation/demolition. The number of notifications received by the fourth quarter of 1985 rose to 282, a 450% increase. The increase is due, in part, to the reasons outlined above. It is also due to the threat of heavy penalties for noncompliance. A year later, fourth quarter 1986, the number of notifications increased to 535.

One important component of the Asbestos Compliance Program is the training of the workers, foremen, and inspectors of asbestos projects. EPA recently approved two training courses for the workers and managers (the "competent persons program") involved in asbestos removal and demolition. Alaska and Washington currently hold training programs to certify workers, and Oregon will begin training courses soon. An inspector training course is offered by EPA once every six months. One such training course was held in June, 1987, with more than 30 NESHAP inspectors participating.

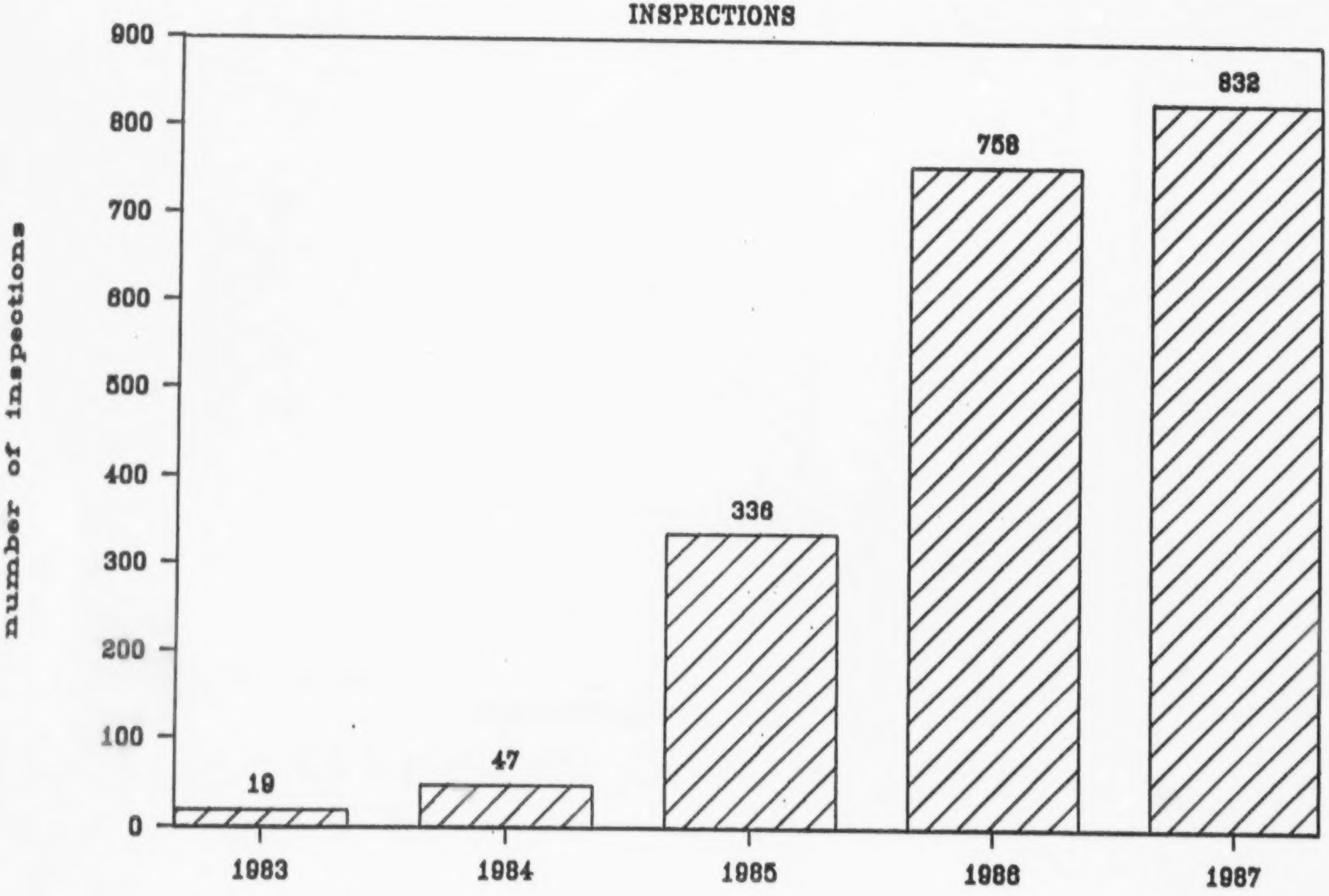
Region 10, also endeavors to provide uniform information to the public and contractors with the Asbestos Outreach program. This program is for building owners, and/or the operators of commercial, industrial, institutional, governmental, and residential buildings, and is designed to provide sufficient information so that asbestos exposure can be minimized. In order to accomplish this, informational documents are being printed, and consistent policies on handling information requests have been formulated. Training sessions and workshops are being scheduled, written information is being packaged, some of which is scheduled for publication in trade association publications. The information provided by this outreach program ranges from sample collection and analysis to risk assessment and regulation updates.

NESHAP ACTIONS--REGION 10

NOTIFICATIONS OF VIOLATION



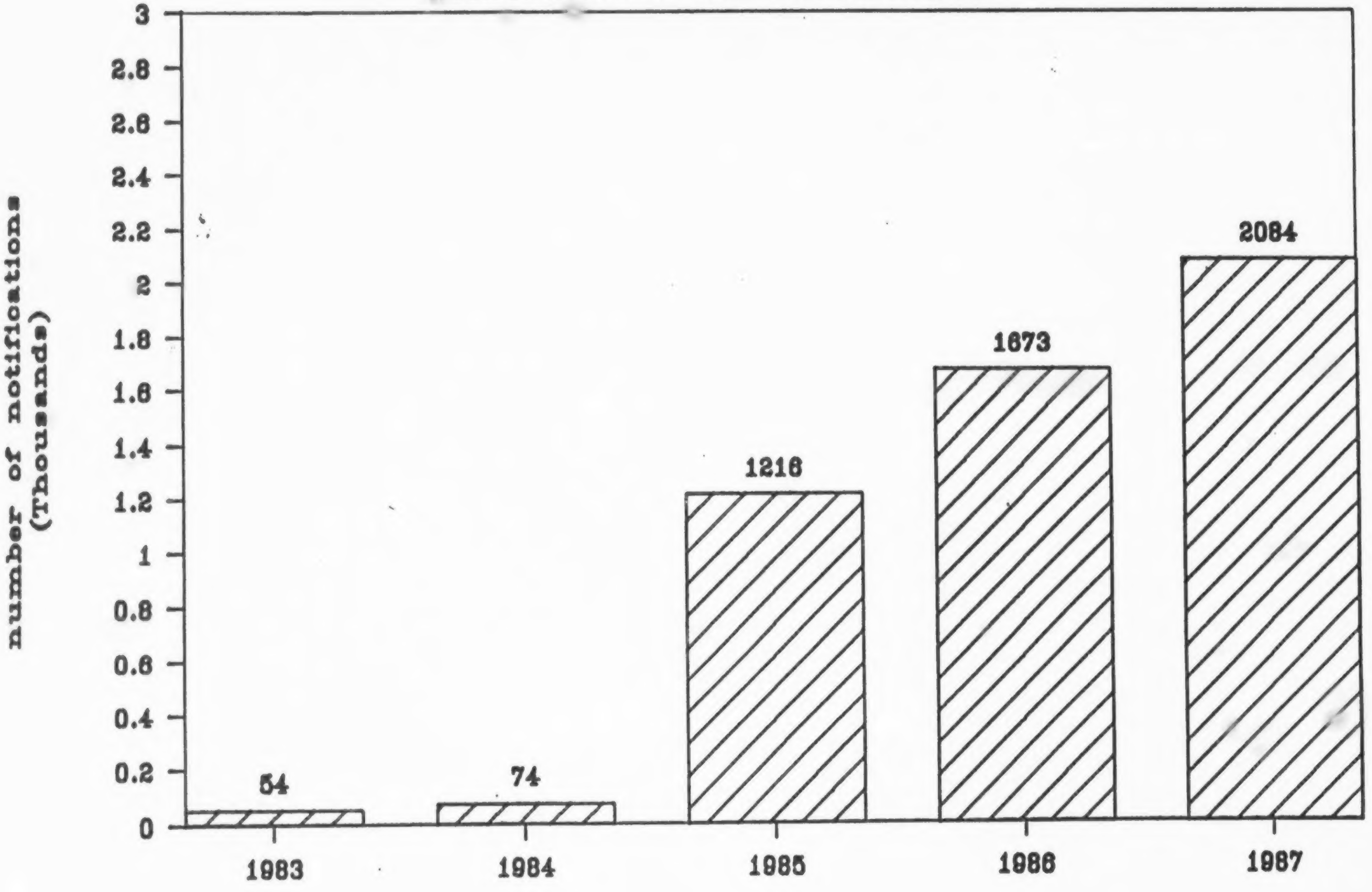
NESHAP ACTIONS--REGION 10



INSPECTIONS

NESHAP ACTIONS--REGION 10

NOTIFICATIONS OF REMOVAL/RENOVATION



Radiation

Current Proqram Status

There are two major Department of Energy nuclear facilities (the Hanford Reservation and the Idaho National Engineering Laboratory), a nuclear naval shipyard. and two power reactors located in Region 10. The regional radiation program provides technical guidance to the EPA programs governing these sites.

Radon concentrations have been found in varying levels throughout the states in Region 10, some of which are over EPA action limits of 4 pCi/L. There has been increased interest and activity in all four states with regard to radon evaluation and mitigation programs. As the states focus more attention on this issue, Region 10's role as coordinator between national policy makers and state and local governments will increase. States will become more involved in risk assessment, surveys, public education, and mitigation.

Several state and local agencies are also expressing concern about radio frequency (RF) radiation, and are considering regulations to control public exposure to nonionizing radiation. Region 10 has been active in assisting agencies in RF measurement studies and interpreting results. Various areas, such as Multnomah County and the City of Portland in Oregon, as well as King County, Washington, have areas with public exposure limits in place or under consideration.

The region is also involved in the coordination of the Idaho Radionuclide Study. This study is being managed by EMSL (EPA's Las Vegas facility) as a multi-year effort to determine the extent and sources of radiation exposure to citizens of southeast Idaho, near Pocatello, due to the phosphate industry located there. The study was initiated as a result of uncertainty over whether the public living near elemental phosphorus plants were adequately protected by the new radionuclide standards which applied to those plants. Region 10 will assist with the coordination between the state of Idaho, local agencies, local elected officials, affected industrial groups, the public, and the media. The study will try to identify public radiation dose and route of exposure to determine whether future mitigation actions are necessary.

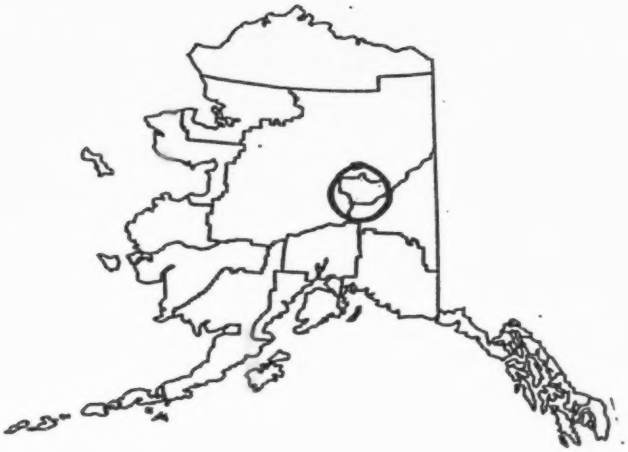
At the end of the l8 month study, it will be Region 10's responsibility to deal with any significant findings.

Environmental Indicators

Environmental indicators or signs of progress toward reducing human exposure to radiation are difficult to list. Success might be measured by quantifying EPA's educational efforts in the community. As radon in homes is naturally occurring, and cannot be regulated, the educational effort is an important way for EPA to assist homeowners in deciding the appropriate course of action to be taken to reduce their exposure to radon.

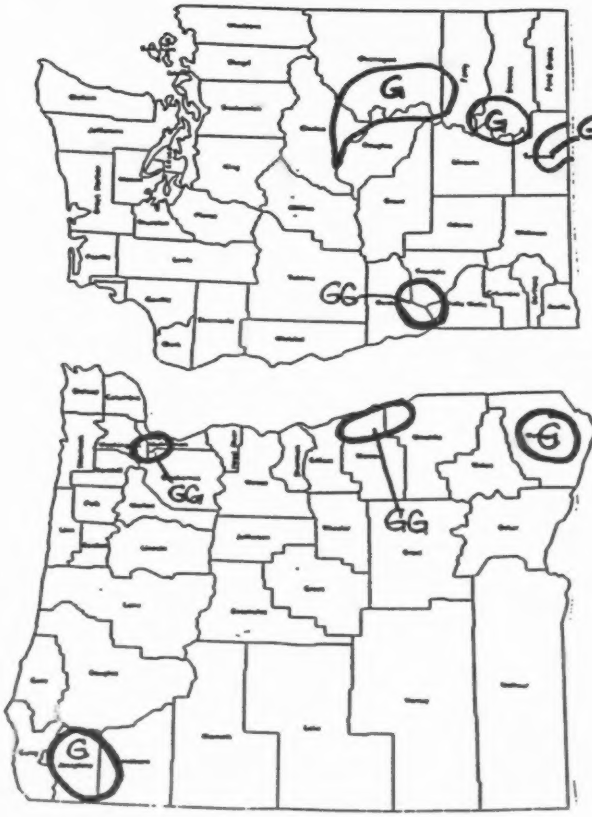
The risk of exposure to radiofrequency radiation decreases as more areas implement regulations to control nonionizing radiation.

PROBABLE AREAS OF HIGH RADON CONCENTRATIONS



G = Granite soil type

GG = Granitic Gravel soil type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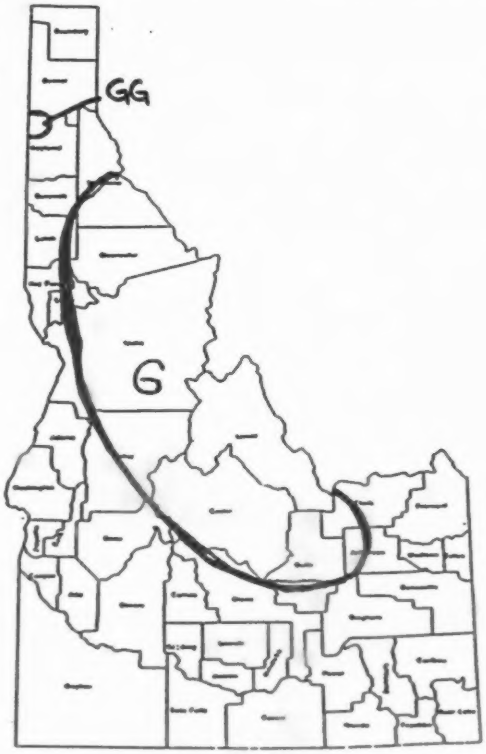


RADIATION

Radiofrequency

Region assisting state/local agencies in RF measurement studies and interpreting results.

Heightened public awareness through education.

Radionuclides

Region has been instrumental in the Idaho Radionuclide Study --a multiyear study of extent and sources of radiation exposure due to phosphate industry.

Radon

Extensive public education program concerning radon

Air Enforcement Program

The goal for the air enforcement program is to see that all major stationary sources of regulated air pollutants come into compliance with their State Implementation Plans and the Clean Air Act.

Environmental Indicators

The objective of the air enforcement program is to challenge significant air violators and return them to compliance. The significant violator program is intended to identify highest priority sources within the Region, so that the states can deal with these sources directly. EPA will begin enforcement activity with a specific source if the state is not taking appropriate action.

During FY87, all twelve of Region 10's Fixed Base Significant Violators were brought back into compliance (resolved). In addition, all three dynamic base significant violators were resolved. (see graph) In all instances, a resolution was brought about by the state or local regulatory agency without EPA assuming the enforcement lead. EPA provided guidance to the state and local governments, and tracked the enforcement process with a "monthly significant violator report".

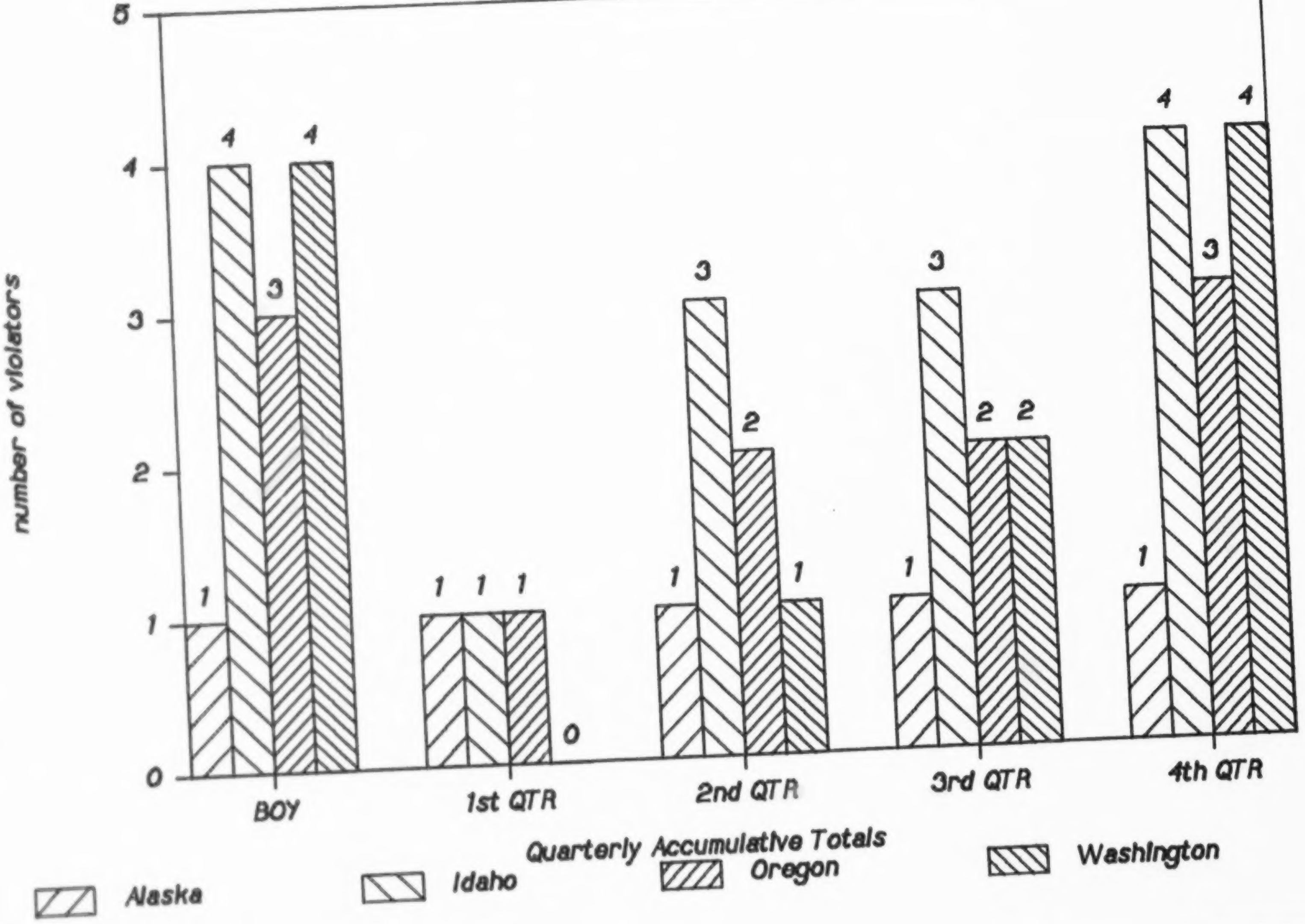
Source inspections are conducted each year, and form a crucial part of the air compliance/enforcement program. These inspections include both the state/local inspections and EPA-retained contractor inspections. EPA also conducts a limited number of inspections, usually in conjunction with the state.

During FY87, EPA conducted a total of 31 inspections for the purpose of case development and oversight. Included in these were two series of source category specific inspections with EPA visiting a number of pulp mills and oil refineries throughout the Region.

Each year, states are required to inspect a certain percentage of their "universe" of sources during the fiscal year. In FY87, all four states committed to inspecting over 90% of the sources in their state under the catagories of A1 SIP, A1 NSPS and all NESHAP sources. Progress toward meeting the commitments was monitored by EPA and periodically reported to the Operations 0ffices for verification. Although the states are not required to have all data for FY87 into the Compliance Data System (CDS) until January I, 1988, it is apparent that the states will meet or exceed their original commitments (see graph).

FFY 87 SIGNIFICANT VIOLATORS

QUARTERLY RESOLUTION



Air Environmental Indicators
Modifications for FY 88 and Beyond

Air Programs Branch intends to adopt and implement or explore the following environmental indicators in FY 88. We are committed to the adoption and implementation of those environmental indicators for which data or some other known surrogate measure is available. As identified in the list, we will explore potential indicators for those programs which do not have databases. We reserve the right to add, delete or modify this list based on improved data gathering/monitoring capabilities, etc.

1. **Criteria Pollutants**
    - Ambient air quality data and analyses
    - Emission inventory data (for use as a surrogate measure)

    Obtained from reasonable further progress reports for non-attainment areas, and SIP submittals for PM_{10}*; future submittals for* CO/O_3

2. **Air Toxics**
    - Begin to track annual changes to baseline air toxics inventory for selected pollutants
    - Review state evaluation and control of point sources of toxic air pollutants

3. **NESHAP *(Asbestos)***
    - Track notifications, inspections and notices of violation

4. **SIP Activities**
    - Track rulemaking activities/SIP approvals by pollutant

5. **Enforcement**
    - Track significant violators—NSPS, non-attainment areas, federal facilities, and compliance orders
    - Explore the possibility of linking specific enforcement actions (i.e. reduced emission rates) to decreases in ambient pollutant concentrations

6. **Radiation**
    - Explore the establishment of baseline radon levels based on existing data; compare baseline to future measurements
    - Explore the use of ERAMS (Environmental Radiation Ambient Monitoring System)
    - Explore the establishment of a pilot study to track the distribution of homeowners' pamphlets and at a later date, survey those households to determine if "measures" were taken

Toxics Environmental Indicators for PCBs
FY 87 and FY 88

1. **Early Disposal**
    - We will continue to track on a quarterly basis quantities of PCB materials sent for early disposal (i.e., disposed of prior to end of useful life) as a result of settlement of PCB complaints.
2. **PCB Levels in Biota**
    - During FY 88, we will maintain our relationships with those groups in the environmental community who are involved in PCB studies, and determine from them on a quarterly basis whether new relevant data are available which would help identify trends in PCB levels in the biota. We anticipate at a minimum that new NOAA Mussel Watch data will become available during this fiscal year and that such data will be incorporated into a revised PCB indicator report.
3. **Compliance Indicators**
    - During FY 88, we will examine historical TSCA PCB regulations compliance rates for various categories of violations and for various industries. We will select at least two indicators of compliance trends and prepare a summary report by the end of the fiscal year.

Environmental Indicators For PCBs

Introduction

EPA's program to assess PCB and organochlorine pesticide concentrations in the environment was initiated to determine the status and trends of these environmentally persistant compounds. This report will discuss the Polychlorinated Biphenyls or PCBs.

Historical and current data relating concentrations of PCBs and organochlorine pesticides in fish, shellfish, wildlife and sediments have been compiled and analyzed. Comparisons of historical and current PCB data yield some information about changes in the average concentrations of these compounds and provide some indication of environmental improvements which in turn may reflect the effectiveness of EPA's PCB program.

This study reviews previously issued reports and provides environmental status and trend results from three monitoring programs: 1) U.S. Fish and Wildlife Service's National Pesticide Monitoring Program; 2) Sediment Sampling of Puget Sound by various groups and projects; and 3) Mussel Monitoring Programs—NOAA's "Mussel Watch" and a seperate EPA mussel sampling and analysis program.

Because of the diverse sources of data, different methodologies, purposes, and geographic focuses of the many studies, the data are in many cases not directly comparable. This prevents the drawing of broad conclusions concerning temporal trends of these compounds. The findings will, however, be useful for establishing the direction of future analyses.

1. Pesticide Monitoring Project - U.S. Fish and Wildlife

Recognizing the need to establish a long term monitoring program to assess levels of persistent organochlorine pesticides in the environment, the U.S. Fish and Wildlife Service (USFWS) began monitoring for organochlorine pesticides in freshwater fish, starlings, mallards and black ducks in the 1960's. The goal of their program was to assess average environmental levels of these contaminants and to provide data to help indicate the status of environmental conditions.*

The USFWS also collected data on PCB levels. The report presents only the Washington State PCB data (Tables 1, 2, 3). (The summary data on PCBs were collected from A. Barron's review of USFWS reports.)

Station Number	Location
S44	Yakima River at Granger, Washington
S46	Columbia River at Cascade Locks, [illegible]
S96	Snake River at Ice Harbor Dam, Washington
S97	[illegible]
S98	Columbia River, [illegible], Washington

Review of the USFWS data indicates a general decrease in PCB contamination of those Washington State species analyzed over the last two decades (see Figures 1,2,3). The USFWS reported Washington State PCB averages to be similar to or less than average national levels. Although PCB residues are still common in samples from rural areas in Washington, the levels since 1981 are very low, between detection and 0.05 ppm.

Table 1

PCB Residues in Freshwater Fish (in ppm, wet weight)

Year	Station				
	S44*	S46	S96	S97	S98
1970	.36	.99	1.32	.79	.74
1971	.78	.57	.35	.95	.71
1972	1.18	.75	.38	2.36	2.78
1973	.00	.56	.48	.35	.78
1974	.34	.45	.11	.06	.22
1976	.57	.40	.32	.06	.18
1978	.01	.29	.06	.15	.12
1980	.00	.30	.00	.04	.05

*Average calculated for the 2 samplings at station 44

Table 2

PCB Residues in Wings of Mallards and Black Ducks (in ppm, wet weight)

Year	PCBs
1969	.14
1972	.06
1976	.11
1979	.04
1981	.01

Table 3

PCB Residues in Starlings (in ppm, wet weight)

Year	County			
	Pierce	Yakima	Spokane	Whitman
1970	.01	.13	.06	.06
1972	.09	.003	.12	.007
1973	.13	.001	.030	.046
1976	ND*	ND	ND	ND
1979	ND**	ND	ND	ND
1980	.03	ND	ND	.05

*ND = Not Analyzed. [illegible]

**ND = Not Detected [illegible]

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*USFWS. Various papers re: monitoring of organochlorine residues in freshwater fish, 1970-1981. Overview prepared by A. Barron

Figure 5

PCB RESIDUES IN FRESHWATER FISH

VARIOUS SITES AROUND WA. STATE

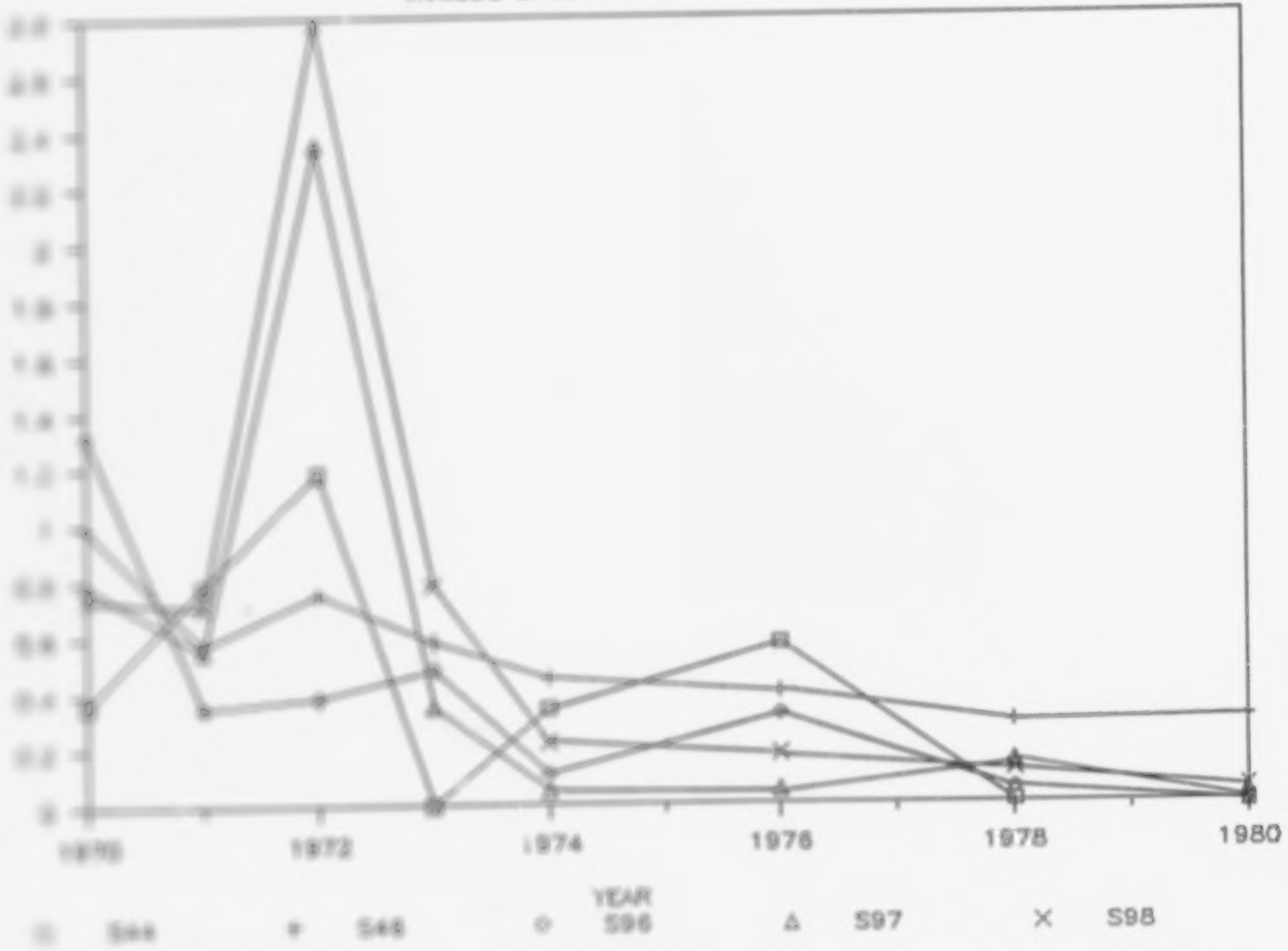


Figure 2

PCB RESIDUES IN WINGS OF MALLARDS/DUCKS

FOR WASHINGTON STATE

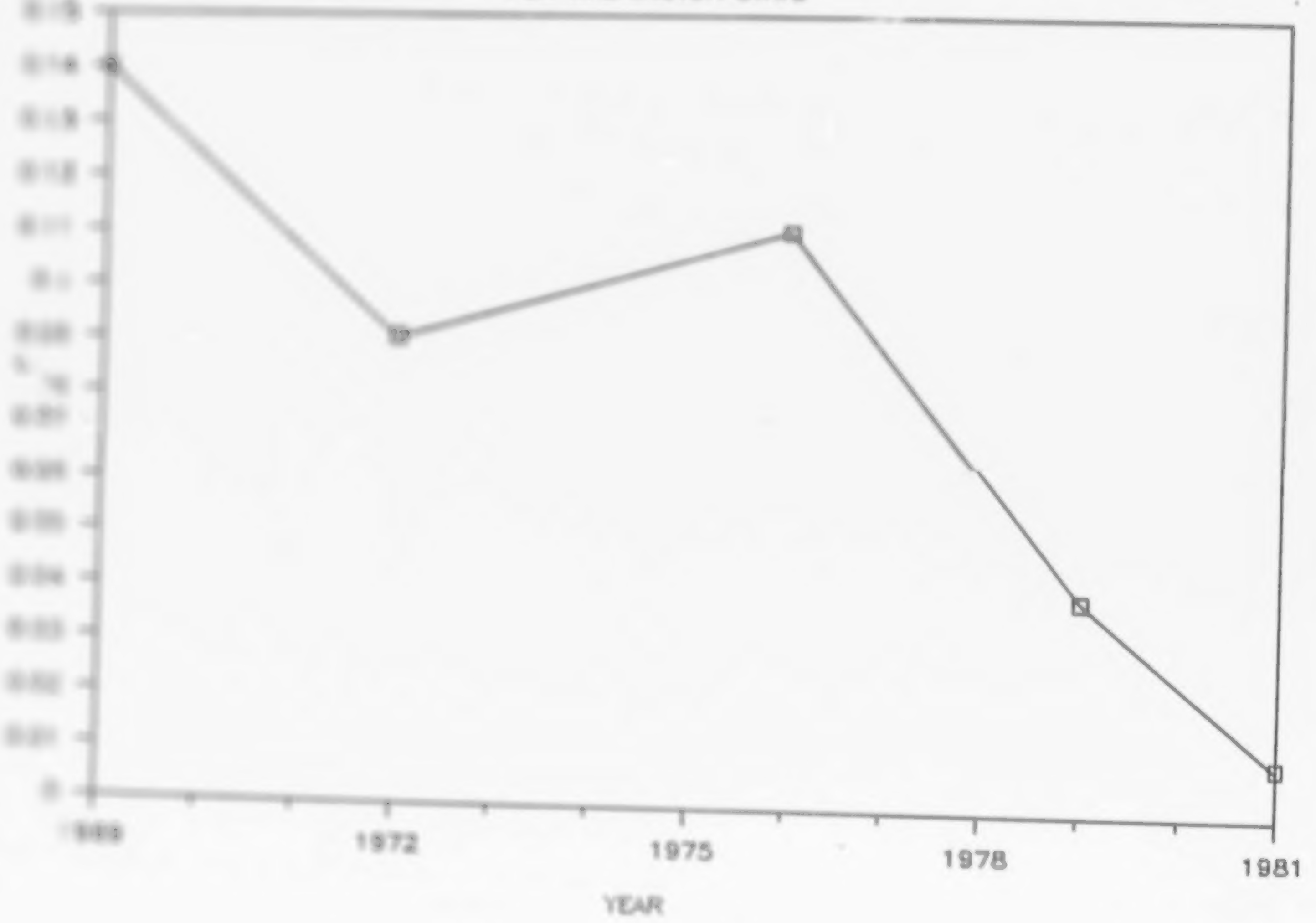
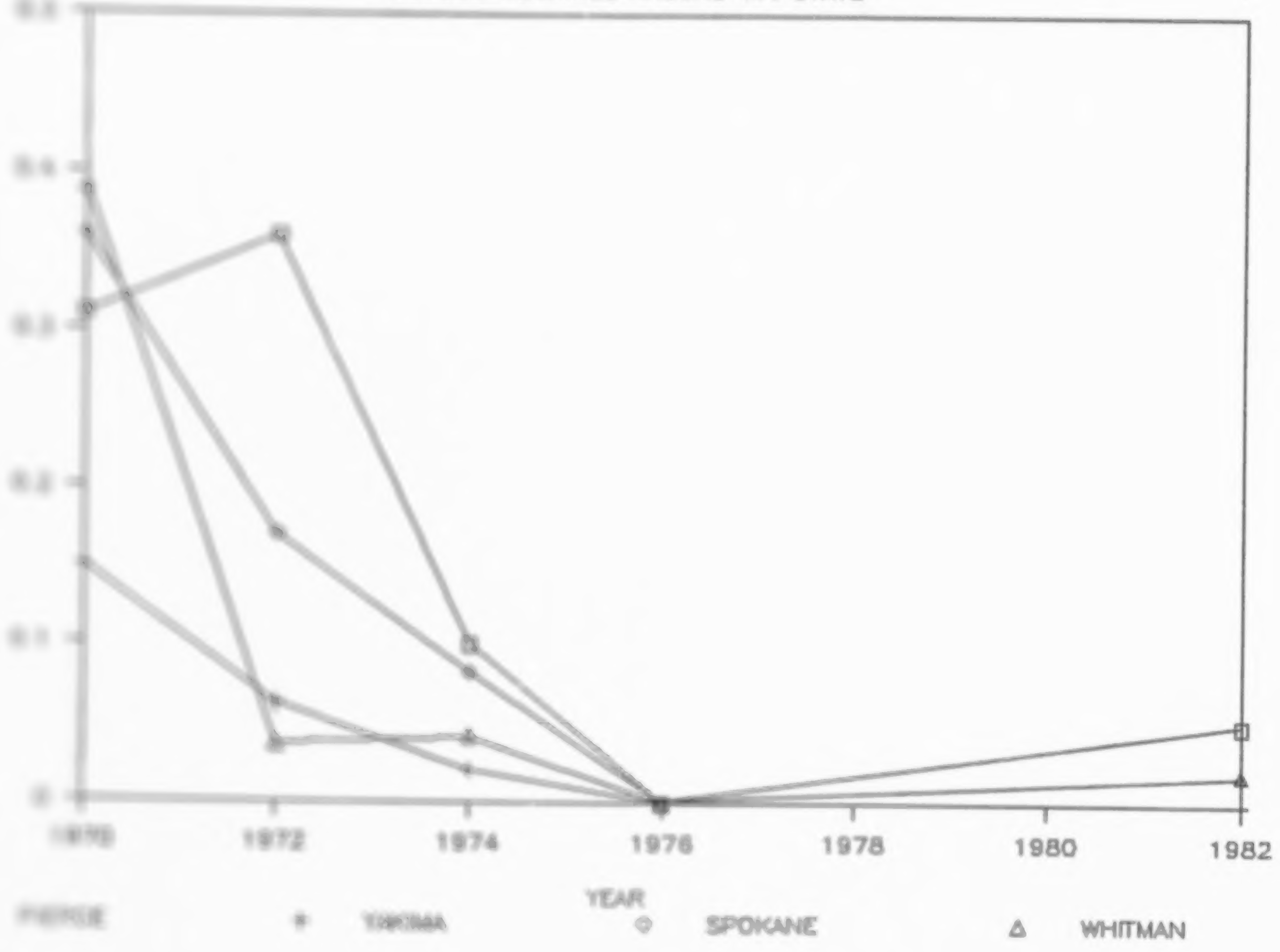


Figure 3

PCB RESIDUES IN STARLINGS

VARIOUS COUNTIES AROUND WA. STATE



2. Puget Sound Sediment

The following discussion reviews data which describe levels of PCBs in Puget Sound sediments and, in a few cases, the variations of those levels over time. For purposes of this review, the studies selected were those that sampled similar sites around Puget Sound.

Many of the sediments analyzed were from highly contaminated, urbanized areas, such as Seattle's Elliott Bay and Tacoma's Commencement Bay. Other "reference" sites, e.g., Admiralty Inlet and Case Inlet, were located away from large population centers. The locations of the embayments studied in this report are shown in Figure 4.

Concentrations of PCBs in Puget Sound sediments varied from area to area and between studies. Sediments from some stations contained consistently high PCB concentrations over time, while other stations yielded samples with concentrations that were usually at or below detection. The highest concentrations of PCBs in sediment samples were from the waterways of Commencement Bay (Tacoma), the Duwamish River, Elliott Bay (Seattle), Sinclair Inlet (Bremerton), and Everett Harbor.

Sediment samples from Case Inlet, Port Madison (Admiralty Inlet), Budd Inlet, and the San Juan Islands were significantly less contaminated with PCBs than sediments sampled in urbanized areas, but were not completely free of PCB contamination.

The most highly contaminated areas (maximums on graphs and tables) include Elliott Bay (both offshore and near shore), the Commencement Bay waterways, Sinclair Inlet, and Everett Harbor (Fig. 5). Concentrations of PCBs in these areas ranged in the thousands and tens of thousands of parts per billion. Tables 4 and 5 tabulate and rank the PCB concentrations found in the sediments sampled.

The sampling and analysis of sediments seems to be a viable alternative to tissue analysis for the purpose of characterizing the condition of a given area (environmental indicator). Although environmental trends of PCBs in Puget Sound sediments cannot be definitively stated, a general picture of PCB contamination can be drawn.

The most current Puget Sound Water Quality Authority (PSWQA) report shows PCB concentrations to be similar to those reported in 1984. Reports by Malins et al. in 1979 and the PSWQA in 1984 (Fig. 6) indicate that areas contaminated by PCBs remained highly contaminated through those years.

Because the data on PCBs are limited for a variety of reasons, it is not appropriate to draw strong conclusions concerning positive or negative environmental trends. There is, however, little evidence to show that PCB levels in Puget Sound sediments have declined significantly over the past decade.

The PSWQA and other groups using standardized methods are currently producing PCB data which will enable environmental policy planners to perform trend analyses.

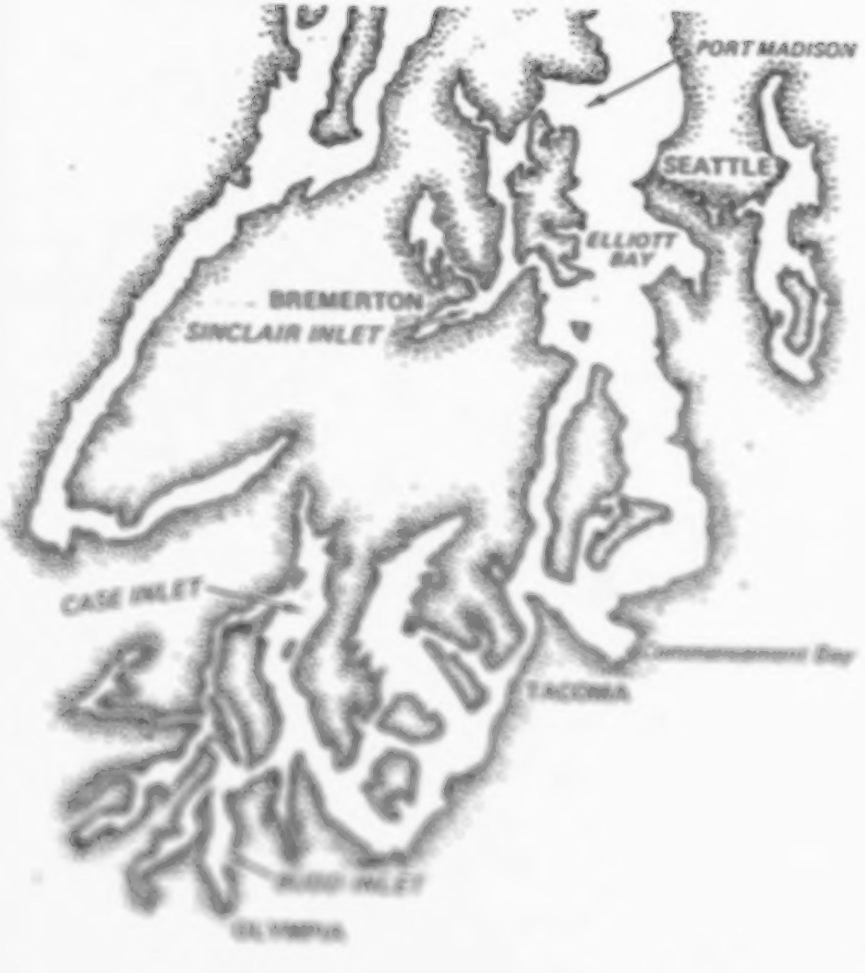

PORT MADISON
SEATTLE
ELLIOTT BAY
BREMERTON
SINCLAIR INLET
CASE INLET
Commencement Bay
TACOMA
BUDD INLET
OLYMPIA

Figure 6: Locations of studied embayments in Central and Southern Puget Sound.
Source: NOAA Technical Memorandum OMPA-2

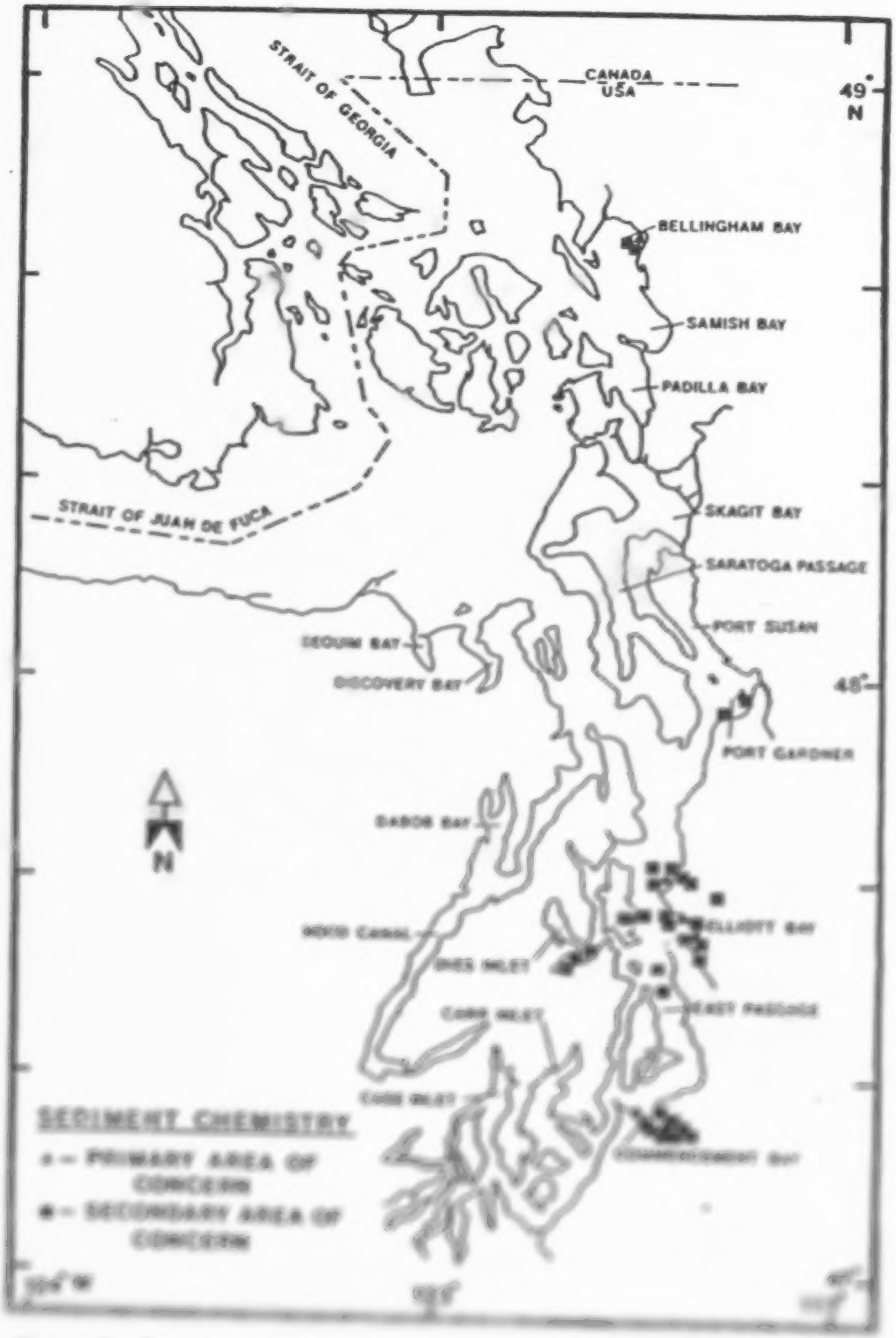

STRAIT OF GEORGIA
CANADA
USA
49°
N
BELLINGHAM BAY
SAMISH BAY
PADILLA BAY
SKAGIT BAY
STRAIT OF JUAN DE FUCA
SARATOGA PASSAGE
PORT SUSAN
SEQUIM BAY
DISCOVERY BAY
48°
PORT GARDNER
N
DABOB BAY
ELLIOTT BAY
HOOD CANAL
SINCLAIR INLET
EAST PASSAGE
CARR INLET
CASE INLET
COMMENCEMENT BAY
SEDIMENT CHEMISTRY
○ – PRIMARY AREA OF CONCERN
● – SECONDARY AREA OF CONCERN
124° W
123°
47°
122°

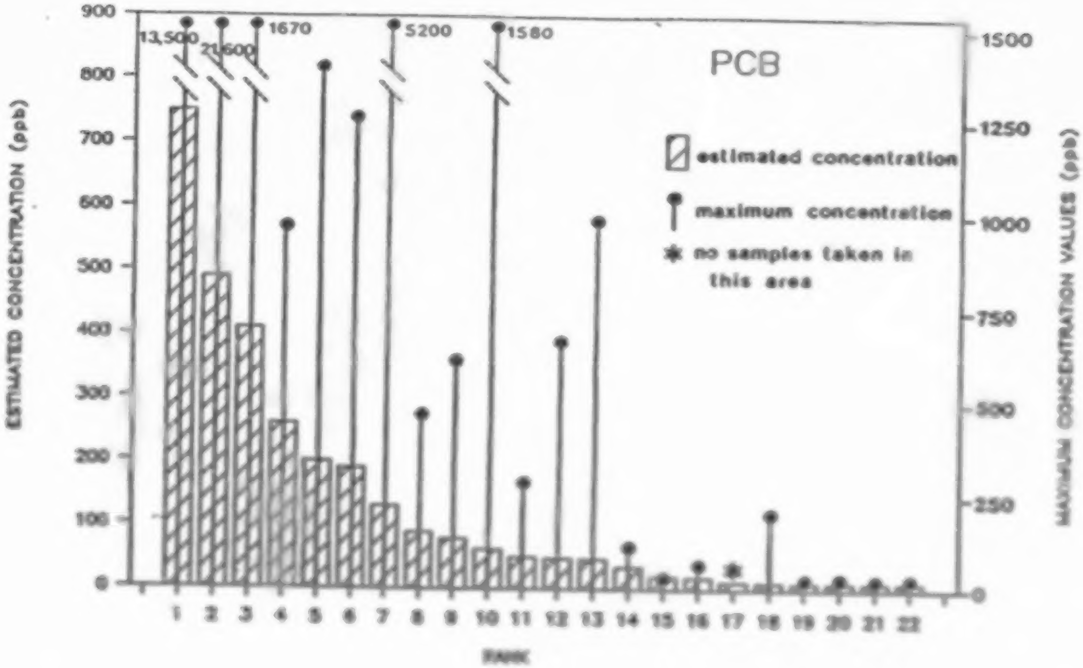
Figure 5. Locations of sediment chemistry concerns and [illegible]

Table 6: Observed concentration range, estimated concentrations and burdens of sediment PCBs within each region and subregion of Puget Sound. Estimated concentrations were rounded to two significant figures and estimated burdens were rounded to one significant figure.

Source: Puget Sound Environmental Atlas, February 1987 Evans-Hamilton, Inc.

GEOGRAPHIC AREA	AREA (SQ.KM.)	OBSERVED CONCENTRATION RANGE (PPB)	ESTIMATED CONCENTRATION (PPB)	ESTIMATED BURDEN (KG)	NUMBER OF SAMPLES
TOTAL PUGET SOUND	4973	BDL*-21,600	20	3000	501
SAN JUAN ISLANDS	1313	<20	10	400	5
Bellingham Bay	2	<20-100	35	2	8
EASTERN STRAIT OF JUAN DE FUCA	1129	1-20	10	300	6
ADMIRALTY INLET	276	-	12	100	0
WHIDBEY BASIN	300	1-200	11	200	5
Everett Harbor	5	22-450	89	10	13
East Waterway	1	84-970	260	6	5
HOOD CANAL	343	1-20	<20	100	4
CENTRAL BASIN	642	BDL*-1580	62	1000	186
Shilshole Bay	3	10-660	48	7	7
METRO W. Point Trunk Sewer Outfall	1	13-610	79	2	9
Outer Elliott Bay Nearshore	4	35-260	50	6	2
Outer Elliott Bay Deep	15	5-1400	200	80	36
Inner Elliott Bay Nearshore	3	1-13,500	750	60	33
Inner Elliott Bay Deep	11	2-21,600	490	200	32
Commencement Bay Nearshore	7	7-9200	130	200	96
Commencement Bay Deep	27	BDL*-990	47	30	21
Northwest Sinclair Inlet	4	28-1670	410	30	10
Southern Sinclair Inlet	7	1250	190	30	1
Eagle Harbor	2	6-60	19	1	4
SOUTH SOUND	362	BDL*-30	10	100	15
Budd Inlet	20	5-19	10	6	3

* Below Detection Limits



RANK	GEOGRAPHIC AREA	MAXIMUM CONCENTRATION (PPB)
1	Inner Elliott Bay Nearshore	13,500
2	Inner Elliott Bay Deep	21,600
3	Northwest Sinclair Inlet	1,670
4	East Waterway	970
5	Outer Elliott Bay Deep	1,430
6	Southern Sinclair Inlet	1,250
7	Commencement Bay Nearshore	5,200
8	Everett Harbor	490
9	METRO North Trunk Sewer Outfall	630
10	Central Basin	1,580
11	Outer Elliott Bay Nearshore	300
12	Shilshole Bay	680
13	Commencement Bay Deep	1000
14	Bellingham Bay	120
15	Hood Canal	30
16	Eagle Harbor	60
17	Admiralty Inlet	NS*
18	Whidbey Basin	200
19	San Juan Islands	<20
20	South Sound	30
21	Budd Inlet	20
22	Inner Strait of Juan de Fuca	20

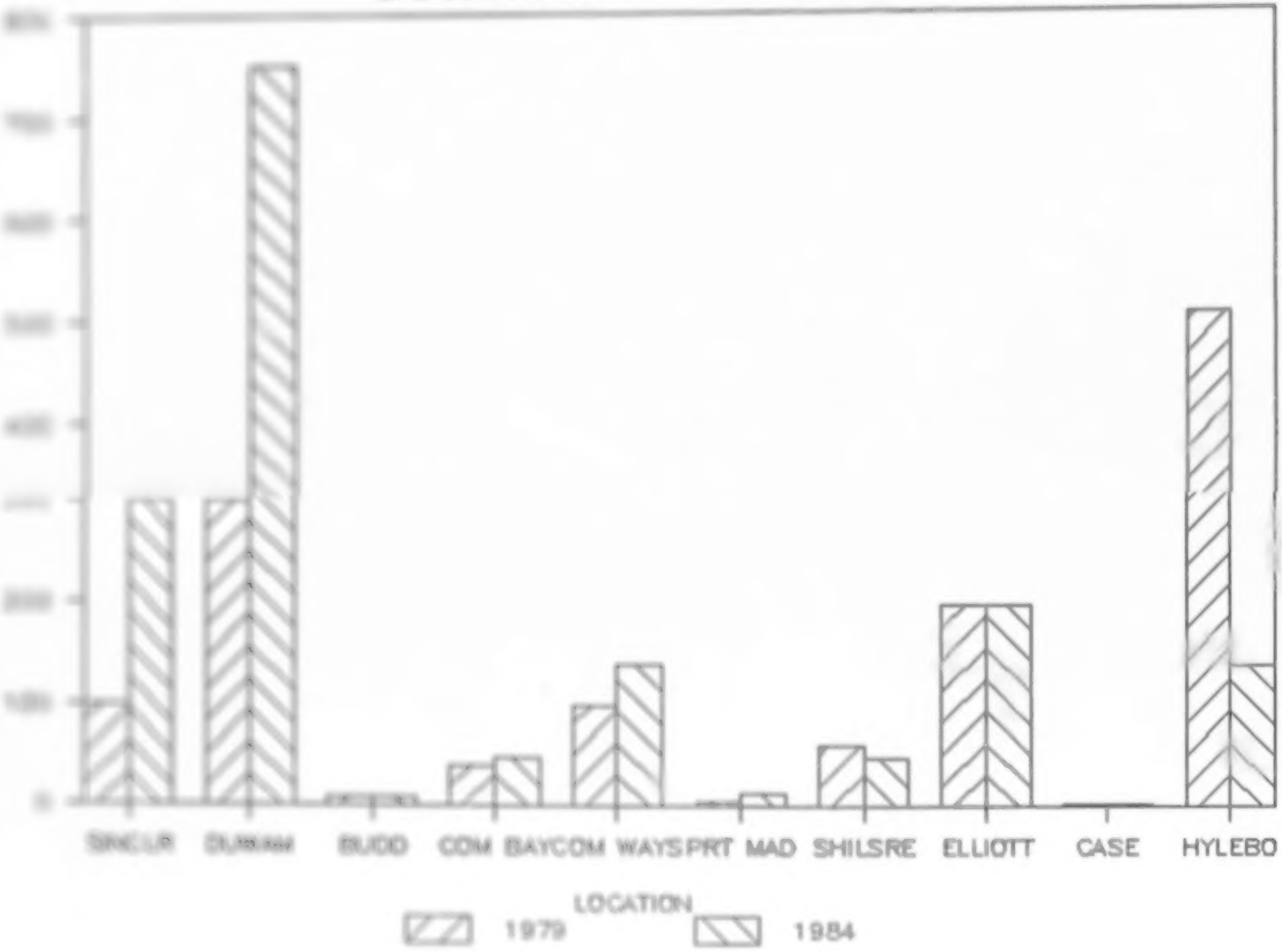
* No samples taken in this area.

Table 5: Ranking of regions and subregions of Puget Sound based on estimated sediment concentrations of PCBs. (●) indicates maximum concentration found in each area. Plain numbers of symbol were

Figure 6

PCB LEVELS IN PUGET SOUND SEDIMENT

SITE COMPARISON – YRS. 1979 & 1984



3. Mussel Monitoring Programs

Monitoring of mussels is one approach that is being used to indicate the status of chemical contamination in marine environments. There are several reasons for using mussels as indicators of environmental quality: 1) a correlation is thought to exist between the contaminant content of the mussel and an average contaminant content in the surrounding water; 2) mussels are widely distributed geographically, allowing for repeated sampling of the same species between areas; 3) mussels remain at a single location during adult life, making them good indicators of pollutant status in a given area; 4) mussels are relatively hearty, surviving in environments where other species may not.

There have been several mussel monitoring programs past and present, the most extensive being a National Oceanic and Atmospheric Administration (NOAA) effort. Their National Status and Trends (NS&T) Mussel Watch Project will provide comprehensive data on chemical contamination as revealed through mussel tissue analysis. Two earlier national mussel studies pre-dated the NS&T program. One was conducted under the direction of P.A. Butler, National Pesticides Monitoring Program (NPMP), from 1965 to 1972, and a second, EPA's mussel monitoring program, was headed by E.D. Goldberg (1976-1978).

A concern with the available mussel watch data is that the results are often non-comparable. Reasons for this include the following: standardized techniques for analyzing PCBs in tissue samples were not used; different labs reported significantly different values for similar samples at the same sites; some sites were sampled only once, making trend analysis impossible; and results were reported variously as wet or dry weights with no indication of percent moisture. For these reasons, it is difficult to draw conclusions about Washington State PCB trends using the currently available mussel watch data.

However, a major new phase of the NOAA Mussel Watch program which has just been completed for Puget Sound sites is expected to yield valuable information on PCBs and provide data that will be comparable to past mussel watch data. The new information will give environmental managers an opportunity to examine variations in PCB levels in mussel tissue over the past decade.

Conclusions

The USFWS's pesticide studies indicate that there has been a general decrease in PCB concentrations or levels reported in animal tissues in Washington State. This positive trend however, seems to be freshwater related. If marine regions (sediment studies) are included in the analysis, less positive conclusions can be drawn. Puget Sound sediment data indicates that certain areas, "PCB hot spots", produce samples with consistently high PCB concentrations over time. Certainly the high PCB values reported for various Puget Sound "hot spots" warrant continued study. A long term monitoring of Puget Sound sediment will enable environmental managers to more accurately characterize environmental quality trends for Puget Sound.

The following is a list of major studies planned and in progress.

- An urban bay study is currently being completed by the Corps of Engineers on Elliott Bay and Everett Harbor. PCB concentrations from bottom fish and sediment samples will be representative of 1986 environmental conditions and the data will be directly comparable to past research. This report should be available in early 1988.
- The Corps of Engineers and PSWQA are currently conducting surveys of sediments and marine life at recreational marinas due for future dredging. A report due spring 1988, will address concentrations of PCBs, pesticides, and several heavy metals.
- A two year research project involving the chemical analysis of Puget Sound fish, clams, and seaweed, under direction of the Department of Social & Health Services, is currently underway.

Future Directions

An ambitious plan for long term monitoring of the health of Puget Sound has been prepared by the Puget Sound Water Quality Authority and has been presented for approval. Region 10's PCB Program will track the progress of the comprehensive monitoring effort, and will on an annual basis extract and consolidate PCB data obtained from the monitoring. Information obtained is expected to be superior to other sources of PCB data (for use as environmental indicators), both because Puget Sound monitoring will be more comprehensive and because it is intended to be a long term, continuing program. New "mussel watch" data will also be analyzed and used to indicate environmental progress.

Chapter 9: Toxics - Asbestos

Environmental Indicators for Asbestos
FY 87

1. **Abatement**
   - Track, by quarter, the quantities and costs of asbestos abatement achieved by schools settling Asbestos-in-Schools complaints.
2. **Compliance**
   - Compliance rates for EPA inspections

Indicators of Effectiveness
Region 10
Asbestos-in-Schools Program
FY 1986 - FY 1987

Introduction

EPA'S Asbestos-in-Schools Program was the result of a combination of legislative and regulatory actions taken in response to increased awareness of health risks associated with asbestos exposure. Most of the health risk data concerning asbestos has been developed from the high dose long exposure situations found in manufacturing and industrial situations. The Occupational Safety and Health Administration (OSHA) regulations were promulgated to protect workers from such exposure.

EPA's early regulatory efforts were aimed at protecting the quality of ambient air (NESHAPs) and protecting school children (as they may not be adequately protected by regulations written to protect adult workers).

There was very little data available to show the health risks of exposure at the levels and durations experienced by school children. It is generally agreed by scientific researchers that there is no known threshold level below which exposure to asbestos is not a potential health hazard. There were documented cases where children of asbestos manufacturing workers developed asbestos diseases when exposed to levels which could be similar to the exposure a school child would experience if an [illegible] friable asbestos was present due to deterioration, maintenance, damage, or construction activities in the school. Definitive studies of the effects of the presence of asbestos in schools may take 20-40 years to complete because of the long latency periods of asbestos-related diseases.

For the previously stated reasons, the evaluation of [illegible]

The Region's Asbestos-in-School's Program reduces the potential for exposure in several ways. TSCA regulations require the schools to inspect for any friable asbestos-containing material (FACM), analyze samples of suspect material (or assume, absent testing, that the material is asbestos-containing), and notify staff and parents of inspection/analysis results. All 1,340 Region 10 local education agencies (LEAs) were required to be in compliance with these regulations by June 1983.

As of the end of fiscal year 1987, the Region had conducted 700 compliance inspections at LEAs. With one exception, all of these LEAs are presently in compliance; some are in compliance because they responded to the issued regulation, some because of pending EPA inspections, some because of pressure from parents, some because of fear of adverse publicity, and some because of enforcement efforts by EPA. The overall rate of noncompliance was 40%. However, only 13% actually received complaints for significant violations; the remaining 29% were out of compliance for minor violations (such as failure to complete the form required when no FACM is present).

In nearly every case, school administrators agreed there was a need to reduce risk through minimization of human exposure to friable asbestos-containing material, using abatement measures such as removal or other methods for controlling FACM. However, this is not always a high priority. [illegible]

Limitation of Indicators

Nearly every LEA with FACM took some action to reduce exposure during the period of 1979 to 1987. These actions were primarily a result of: EPA's technical assistance program, EPA's TSCA compliance program, or public pressure (a public informed by publicity surrounding EPA's programs). No data have been compiled regarding abatement activities other than those activities associated with enforcement actions. Further, it is only those enforcement actions resulting in civil complaints where EPA has compiled data about exposure reduction. The 43 civil complaints settled in the 1986-87 fiscal years represent about 2% of the total Region 10 student population. It should be clearly understood that this report attempts to show the effectiveness of only one small part of an overall program. The actual impact of those complaints has gone far beyond the schools directly involved, in that many other LEAs were likely influenced by those actions to undertake abatement on their own.

Enforcement Element

In cases where an LEA was substantially out of compliance either at the time of inspection or for at least a year's period after the June 1983 effective date, EPA issued a civil complaint with a proposed penalty assessment. Generally, the proposed penalties for a violative LEA were $6,000.00 per school out of compliance with an additional $4,000.00 to a large LEA for failure to bring individual schools into compliance. In nearly every case, failure to be in compliance translated into failure to have notified parents and/or staff of friable material.

Cases were informally settled through negotiations with the Regional Asbestos Coordinator operating under advice of office of Regional Counsel; none have proceeded to hearing before an Administrative Law Judge. The basic policy, consistent with EPA HQ direction, was to reduce the proposed penalty to a fixed minimum, based upon the LEA's agreement to provide at least dollar for dollar abatement for the amount of reduction of proposed penalty. In those few cases where the cost of **complete** abatement was less than the deferred portion of the proposed penalty, full credit was given for the deferred amount.

Methodology

Data for the analysis were compiled by phone survey. Each LEA was asked to estimate the amount of asbestos abated (encapsulated or removed) to meet the deferred portion of the settlements. There was a great variation in the reported cost of abatement due to conditions, contractors, and methods of financing. Reported costs of abatement range from less than one-dollar to over forty-dollars per square/lineal foot.

In those cases where data were incomplete only dollar amounts or areas of abatement were reported (but not both), a cost factor of eight-dollars per square/lineal foot was used for estimation purposes. The eight-dollar figure was selected on the basis of industry estimates since this was believed to be more reliable than other options, such as averaging the wide-ranging data from the rest of our sample.

Conclusions

The forty-three civil complaint settlement cases of FY 86 and FY 87 resulted in proposed penalties totaling $318,100. Deferred penalties totaled $290,310. The deferment of the $290,310 was negotiated through informal settlement conferences in exchange for asbestos abatement including both removal and encapsulation. Total expenditure for abatement was $1,251,525 for the 43 settled cases. Therefore, for every dollar deferred, $4.31 was spent by LEAs for abatement.

The 43 settlement projects resulted in abatement of approximately 153,000 square feet of sprayed-on asbestos and 8,310 lineal feet of pipe wrapping. Ninety-four schools had asbestos abated resulting in about 27,000 students and staff benefiting from reduced asbestos exposure.

New Directions

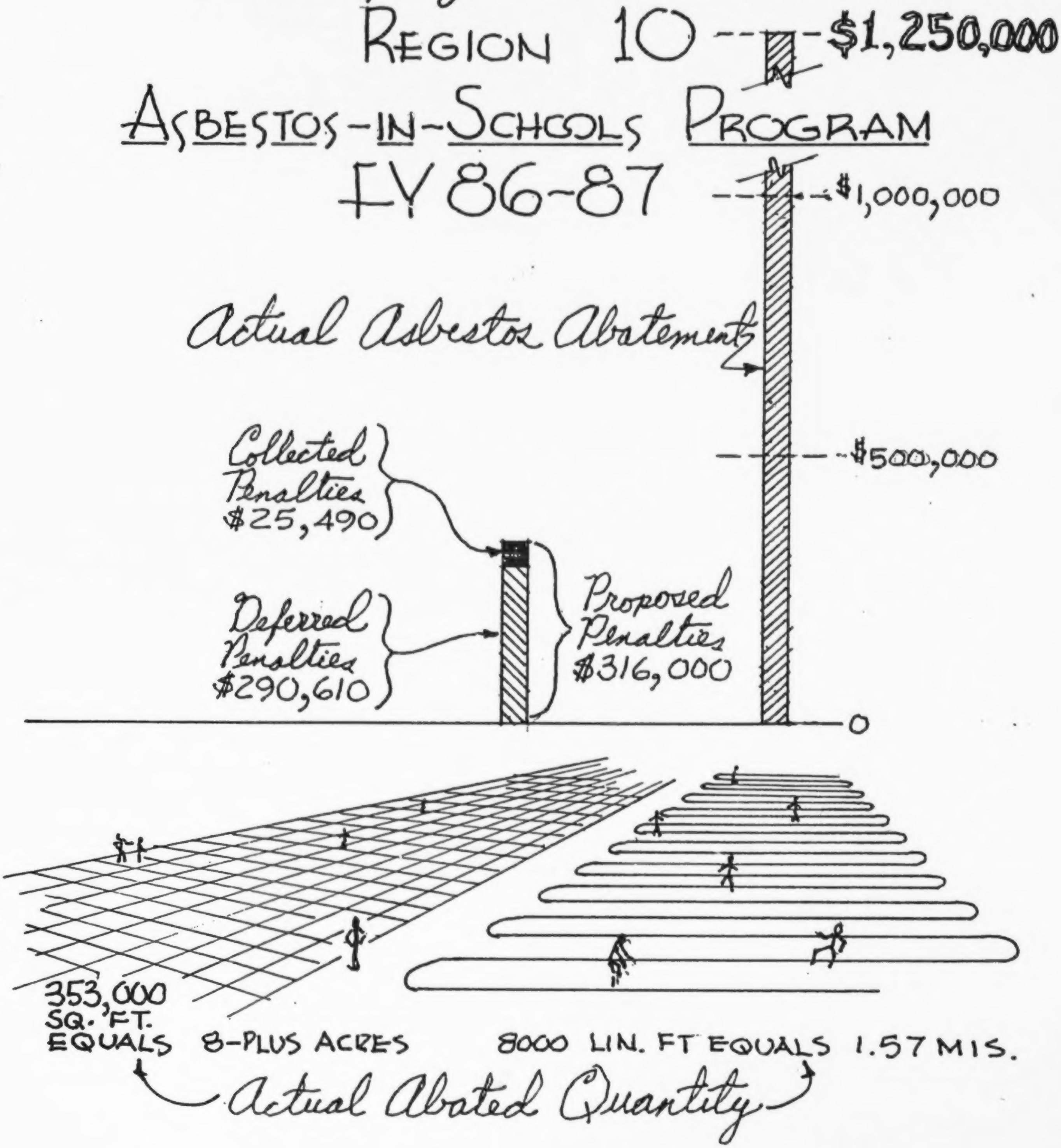
With the promulgation of final regulations for the Asbestos Hazard Emergency Response Act (AHERA) on December 14, 1987, Region 10 will enter a new phase in the Asbestos Program for schools. Since the new program will **require** abatement of all friable asbestos, we can expect large increases in the amount of hazard removed. The rules require the abatements to begin by July 1989.

AIS FY 86 & FY 87 Summary of Abatement After Settlement

Quarter	Number of Schools	Number of Students	Proposed Penalty	Deferred Penalty	Penalty	Dollars for Abatement	Sq. Ft. Abated	Lin. Ft. Abated	Schools Abated	Students Affected
1st	27	6,351	29,200	27,200	2,000	115,528	14,441	0	16	3,807
2nd	18	6,227	30,500	28,000	2,500	56,800	1,676	5,439	12	4,691
3rd	4	1,606	2,600	2,410	200	433,736	17	0	4	1,606
4th	34	9,760	82,400	75,600	6,800	410,512	49,555	1,759	22	6,890
FY 87 Totals	**83**	**23,944**	**144,700**	**133,210**	**11,500**	**1,016,656**	**119,884**	**7,198**	**54**	**16,994**
FY 86 Totals	**90**	**23,983**	**171,400**	**157,400**	**16,300**	**234,867**	**232,791**	**1,145**	**40**	**10,273**
Grand Total	**173**	**47,927**	**316,100**	**290,610**	**27,800**	**1,251,523**	**352,675**	**8,343**	**94**	**27,267**

Total Region 10 Student Enrollment: 1,612,973

INDICATORS of EFFECTIVENESS
REGION 10
ASBESTOS-IN-SCHOOLS PROGRAM
FY 86-87



Environmental Indicators for Asbestos
FY 88 and Beyond

1. **Abatement**
   - We will continue to track on a quarterly basis the quantities and costs of asbestos abatement achieved by schools settling Asbestos-in-Schools complaints.

2. **Asbestos-in-School Summary Report**
   - As the Asbestos in Schools program draws to a close this year (and we transfer to activities under the Asbestos Hazard Emergency Response Act (AHERA)), we will review historical program trends and accomplishments and present them in a summary report. The types of things highlighted will include: compliance levels over time, percent of school districts and student populations covered; percent of respondents in continuing compliance with settlement agreements; asbestos abatement achieved by schools settling complaints; etc.

3. **AHERA Indicators**
   - The majority of program activities for AHERA will commence in FY 88, as program guidance is made available by HQ EPA, we will develop appropriate environmental indicators and propose them by Sept. 1988.

Chapter 10: Pesticides

Pesticides Environmental Indicators
FY 87

In FY 87 the Pesticides Program agreed to examine various data sources for use as possible environmental indicators. By the end of FY 87, they were to select environmental indicators based on the results of their search. The following report describes their findings. It is followed by their selections for FY 88 and beyond.

Use of Pesticides Data as Region 10 Environmental Indicators

Background

Generally, the FIFRA program can improve the state of the environment by trying to reduce the risk of pesticide exposure. Under FIFRA, EPA develops pesticide use regulations that are intended to reduce exposure or contamination risks to acceptable levels. Instructions on the safe use of a pesticide product are communicated to the public on product labels. Hypothetically, if pesticide products were applied and disposed of according to label instructions, unsafe residue levels and other forms of excess exposure would not occur. Unfortunately, pesticide regulators are routinely confronted with evidence to the contrary.

Public complaints and independent research findings do inform EPA about unacceptable, pesticide-related risks in the environment. Acute exposure accidents and public complaints suggest that unacceptable levels of risk are present. Independent research may also reveal unanticipated environmental exposure risks. In a regional context, we have the responsibility to share risk exposure information with EPA Headquarters. We should also use such information to target state enforcement activities to a problem area. It is, however, difficult to use these information resources as environmental indicators.

Public complaints about pesticide misuse are the best regulatory tool the Regions have to monitor risk levels. To use complaint data as an indicator, however, requires one to assume that the types of complaints we hear about are representative of actual exposure risks. Although independent research generates "real" environmental data, it also has shortcomings as an indicator. Few independent research activities are conducted as long-term monitoring studies, and FIFRA does not provide funds for environmental monitoring. Thus, both of these potential indicators have limited ability to depict real-world risks, and to help us assess the impact of regional program activities upon pesticide risk levels.

Public complaint data most accurately reflect short-term risks from acute exposure episodes. The Regions and states address such risks through FIFRA enforcement inspections. Complaint logs contain information about the frequency, location and type of chemical misused that helps the program control, to a degree, some unacceptable risks. The FIFRA program already has a system in place to help the Regions and the states use public complaint data to address their most significant exposure problems. The states set their annual inspection priorities each year based partly upon the environmental harm caused by each type of complaint they receive the previous year. Significant misuse problems with respect to a particular pesticide or type of applicator are identified through this process.

Unfortunately, regulators have no basis upon which to assume that public complaints accurately represent real world risks. More serious risks could remain undisclosed. For example, a farmer is not likely to complain about drift damage caused by an applicator who applied an unregistered herbicide to his neighbor's wheat crop if he also relies upon that same applicator to treat his wheat crop each year. Furthermore, the complaint information base does not help regulators identify chronic exposure or bioaccumulation problems. Should historical misuse data suggest to regulators the existence of a long-term contamination problem, funding would not be available under FIFRA to study the problem area. Again, the lack of a more statistically reliable monitoring tool restricts our ability to evaluate how well FIFRA program activities reduce or control short-term exposure risks.

When available, a better tool to use as an environmental indicator would be **routine monitoring data**. A continuous data base with information about pesticide residue levels would help inform regulators about chronic (long-term) or unanticipated exposure risks. Because the FIFRA program does not provide any monitoring funds, Region 10 would need to rely upon other independent studies for this data.

Long-term studies usually focus on persistent pesticides. They also test primarily for pesticides that have already been suspended or cancelled, and so fall short of helping regulators assess what environmental impact current program activities are having. Should unsafe residuals levels be discovered, regulators then face the difficult task of identifying and controlling the original source of contamination. For example, are high levels of pesticide X due to an isolated spill, long-term misuse, cumulative effects of long-term proper use, geographic vulnerability, or a combination of the above?

We do not receive independent study information regularly, but must search for this type of data. Were Region 10 to select such data as an environmental indicator, we would be relying upon the continued research support of other agencies for the data we choose to use. However, routine environmental monitoring data would come much closer than public complaint data to telling us how whether product labels are generating acceptable risk levels. This kind of information base would help us estimate how well the regulated community is complying with cancelled/suspended use restrictions. It could also alert us to significant, chronic effects of a currently-registered pesticide.

Other Pesticides Studies Reviewed for Potential Environmental Indicator Data

1. **Endrin Residues in Upland Game Birds Collected in Washington Apple Orchards.** A monitoring program was designed by the Washington Department of Game (WDG) to assess risks of the rodenticide, endrin, to wildlife using treated orchards. Sampling efforts in 1981/82 by the U.S. Fish and Wildlife Service and WDG revealed lethal endrin levels in a variety of game and nongame bird species. The monitoring was repeated by WDG in late 1982 for comparison to the original data. Between the first and second monitoring, mean endrin residues in breast and liver tissues decreased 84% and 88% respectively. In the second monitoring, a total of 47% of birds analyzed had detectable endrin residues in one or more tissues analyzed, compared to 98% the year before. This significant decrease recorded for mean breast and liver concentration was undoubtedly due to lower endrin usage by orchardists during the fall of 1982. In spite of this decrease, endrin concentrations presented in the last study still indicate a continued risk to wildlife using apple orchards after the 1982 endrin application. The extreme toxicity of endrin to wildlife has been shown in numerous studies, including extensive research by Blus, et al. (1983) in eastern Washington. Potential wildlife health implications from these concentrations include lowered reproductive success, secondary poisoning of raptors and other predators/scavengers, and a potential for direct mortalities.

2. **Pesticides used on grapes in California.** Cesar Chavez of the United Farmworkers Union distributed literature describing the adverse effects of five pesticides which the Union wishes to be banned from use. These pesticides included Methyl Bromide, Parathion, Phosdrin, Dinoseb and Captan. In California, these pesticides are used on grapes.

3. **U.W. Groundwater Contamination Study.** The University of Washington Department of Civil Engineering is conducting a research project entitled, "A Hierarchical Risk-Based Strategy For Assessing EDB and EDB-like Contamination of Groundwater." This project has been funded by the State of Washington Department of Social and Health Services and Department of Ecology. As of August 21, 1986, they had begun a second phase of the project, in which they intended to develop a computer-based methodology for the optimization of well monitoring based on risk/cost considerations. This study is available.

Recommended Approach

Public Complaint Data (Short-term, Acute Exposure Data)

We will continue to work with the states each year to see that frequent incidences of misuse with the potential to cause unacceptable risk are addressed as priorities in their grants. (The one-time, independent studies we reviewed are summarized in Attachment 1).

As available, we will review the annual summaries of pesticide incidents as reported to the **Oregon Pesticide Analytical and Response Center (PARC)**. This group usually describes additional regulatory controls that would help decrease that likelihood of pesticide-related accidents.

We have asked the **Spokane County Health District** for their annual reports when available. They have just started a program that tests cholinesterase blood levels in pest control operators. When received, we will review the data for use as an indicator.

*(**NOTE:** An additional word about pesticide illness claims is warranted. Public claims of pesticide-related illnesses or acute exposure accidents are very difficult to document medically. Furthermore, the nature or frequency of these complaints cannot be extrapolated to the population at large because there is no basis upon which to judge how representative of all actual pesticide accidents the claims are. Media attention strongly influences the kind and frequency of illness complaints received. As another example, it is suspected that most migrant workers are afraid to report pesticide accidents or poisonings for fear of losing their jobs or deportation. Farmers who have worked around pesticides for years will also have a far different interpretation than an urban gardener about what constitutes a pesticide accident worthy of medical attention. Thus, actual exposure risks may be greater on the farm, while health agency claims may indicate greater exposure problems in town).*

Independent Research Studies (Long-term, Chronic/ Bioaccumulative Data)

Not much useful data is currently available. The next two or three years should bring us some material to work with, however. EPA is now funding two studies that we hope will be ongoing.

With stay-in-school assistance, we will continue to follow-up on the three organochlorine studies that **USFWS** has been conducting for **freshwater fish, starlings and mallards/black ducks**. In these studies, levels of dieldrin and DDT and its metabolites were sampled since 1966. EPA has banned the use of these insecticides and levels of these compounds are decreasing in the environment. Because levels are now barely detectable, samples will be taken henceforth only every three or four years.

When available (hopefully beginning in 1988), we will work with ESD to review the results of EPA's **National Bioaccumulation Study** now underway. Fish tissue will be analyzed for several pesticides. Sampling sites were chosen in Washington, Idaho and Oregon that were known to be areas of intensive agricultural activity and a corresponding potential threat to human health. Provided that monitoring of problem areas is continued, this data has good potential for use as an environmental indicator. We will explore the possibility of continued monitoring using ESD support for significant problem areas identified.

We will also review the results of EPA's **National Drinking Water Well** survey, and will work with Region 10 states to see that problem areas are addressed. If EPA and the states decide to perform routine pesticide monitoring at specific sites, the results could provide our best indicator. Some Region 10 states are now independently doing their own well studies. This survey provides us with our best chance for some long-term influence through state regulatory programs.

We will work through the Water Program staff to obtain pesticide monitoring results that are produced as a result of the Puget Sound initiative, and will review them for utility as environmental indicators. We will also work with ESD staff to survey state surface water monitoring programs for pesticide data, and collaborate as appropriate with the Yakima River sampling program being conducted by USGS.

When completed, we can review the summary of estuarine/coastal bivalve data that Alan Mearns is preparing. This is yet another look at DDT, but might include some interesting information about the cyclodienes (chlordane family) and 2,4-D.

*(**NOTE:** The FDA Market Basket data is not useful in a regional context. They take about 12 milk/dairy product samples per year in random locations. Furthermore, they no longer sample in the field, but use wholesale distributors and some supermarkets. So the data base is inadequate for our purposes. Even if a high level of residue was found, it would be very difficult to link occurrence in an orange in a Portland supermarket to the orchard where the orange was grown and misuse occurred).*

Summary

As stated numerous times at the national and regional levels, there are no really good environmental indicators for the pesticide program that accurately show how effectively the program is currently working. However, the potential for use of routine monitoring of pesticides as an indicator does exist, especially in the ground water arena.

Pesticides Environmental Indicators FY 88 and Beyond

1. EPA's National Drinking Water Well Survey
2. EPA's National Bioaccumulation Study
3. Public Complaint Data (Based upon state enforcement logs—not health agency data)

FY88 Activities

1. Work with ESD to review Bioaccumulation Study results when available.
2. Work with ESD and Water programs to review state surface water programs and Puget Sound program for potential indicators.
3. Monitor the USGS Yakima River study.

FY89 Activities

1. Continue to work with ESD to analyze Bioaccumulation Study results.
2. Begin to analyze National Drinking Water Well Study results.
3. Obtain and review the cholinesterase test results from Spokane County Health District if available.

Chapter 11: RCRA

RCRA Environmental Indicators
FY '87

Progress towards protecting groundwater quality at RCRA regulated land disposal facilities (LDFs)—both regulated and non-regulated units—as measured by the following programmatic steps to detect and remedy groundwater contamination:

A. Detection (Steps)

The number of **RCRA regulated LDFs** = Universe

1. The number of **LDFs** with **interim status** groundwater monitoring **systems initiated** pursuant to 40 CFR Part 265
2. The number of **LDFs** with **interim status** groundwater monitoring **systems established** pursuant to 40 CFR Part 265
3. The number of **LDFs** for which the **aquifer** is **characterized** in order to establish an appropriate groundwater monitoring system pursuant to Parts 264 and 270
4. The number of **LDFs** with **final** groundwater monitoring **systems established** pursuant to 40 CFR Parts 264 and 270
5. The number of **LDFs** with **known** groundwater **contamination** due to releases from regulated and/or non-regulated units (SWMUs)

B. Remediation (Steps)

6. The number of **LDFs** with known groundwater contamination due to releases from regulated and/or non-regulated units (SWMUs) for which **remedial actions** have been **initiated**
7. The number of **LDFs** with remedial actions underway for which groundwater **contamination** has been **stabilized** and/or **reduced**
8. The number of **LDFs** with **remedial actions completed**

Chapter 11: RCRA

RCRA Environmental Indicator Annual Summary

Introduction

The FY 87 Summary of the RCRA Environmental Indicator contains the following components: (1) a description of the indicator; (2) a short discussion regarding the limitations of the indicator; (3) a summary of the results (data) of the indicator; and (4) a discussion of the possible directions for the indicator in the future.

The RCRA Environmental Indicator

The RCRA Environmental Indicator is intended to convey information about the progress the region is making towards protecting groundwater quality at RCRA regulated land disposal facilities (LDFs): both regulated and non-regulated units. Under the RCRA program, regulated units subject to groundwater monitoring at LDFs include: surface impoundments, landfills, land treatment units, and some waste piles. These units currently receive regulated hazardous wastes or have ceased receiving regulated hazardous wastes and are subject to the interim status or permit performance and operating standards under Parts 265 and 264, respectively. Non-regulated units at LDFs include waste management units other than regulated units where waste not regulated as hazardous waste under the Subtitle C regulations had been placed in the past. These non-regulated units are commonly called Solid Waste Management Units (SWMUs). SWMUs that are releasing hazardous waste or constituents into the groundwater are subject to the corrective action requirements under Section 3004(u) of HSWA.

Progress for the RCRA Environmental Indicator is measured by placing counts of specific actions or "steps" associated with groundwater protection (detection and remediation) that have been initiated or completed at LDFs. Specifically, the indicator uses the following parameters to measure progress in protecting groundwater at LDFs:

A. Detection (Steps)

The number of **RCRA regulated LDFs** = Universe

1 The number of **LDFs** with **interim status** groundwater monitoring **systems initiated** pursuant to 40 CFR Part 265

2 The number of **LDFs** with **interim status** groundwater monitoring **systems established** pursuant to 40 CFR Part 265

3 The number of **LDFs** for which the **aquifer** is **characterized** in order to establish an appropriate groundwater monitoring system pursuant to Parts 264 and 270

4 The number of **LDFs** with **final** groundwater monitoring **systems established** pursuant to 40 CFR Parts 264 and 270

5 The number of **LDFs** with **known** groundwater **contamination** due to releases from regulated and/or non-regulated units (SWMUs)

B. Remediation (Steps)

6 The number of **LDFs** with known groundwater contamination due to releases from regulated and/or non-regulated units (SWMUs) for which **remedial actions** have been **initiated**

7 The number of **LDFs** with remedial actions underway for which groundwater **contamination** has been **stabilized** and/or **reduced**

8 The number of **LDFs** with **remedial actions completed**

Note: *See Definitions in Appendix A for further clarification of the above parameters.*

Limitations of the RCRA Environmental Indicator

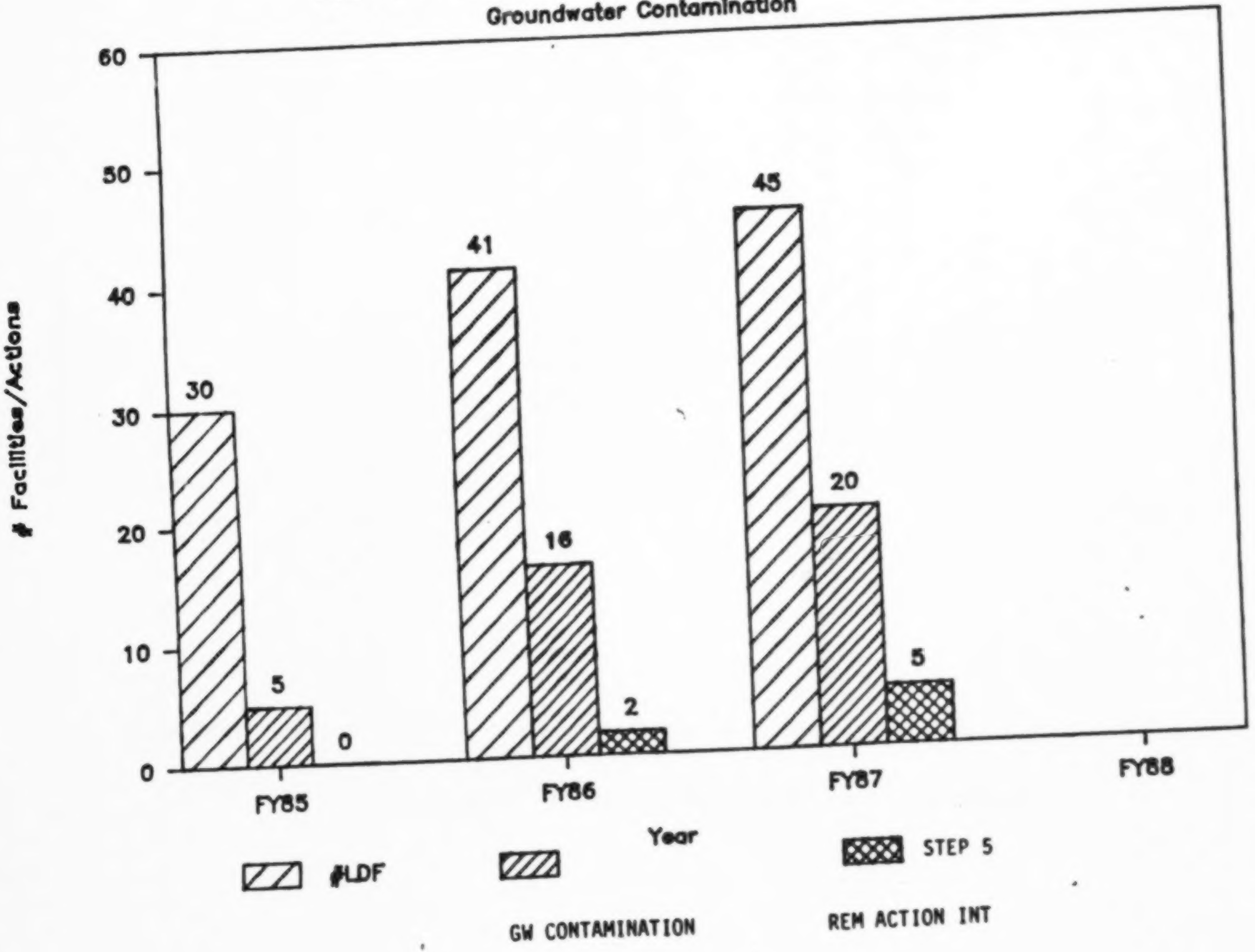
The RCRA Environmental Indicator conveys general information about progress in detecting and remedying releases to groundwater (the primary environmental pathway for releases of hazardous constituents from RCRA regulated facilities). It does not, however, convey specific information about groundwater quality and corrective action measures that would allow conclusions to be made about the state of the environment. For example, the indicator does not convey information about the extent and degree of groundwater contamination nor does it convey information about the risks to human health and the environment from such contamination. Additionally, the indicator does not convey information about the extent to which groundwater quality has been improved as a result of corrective action measures.

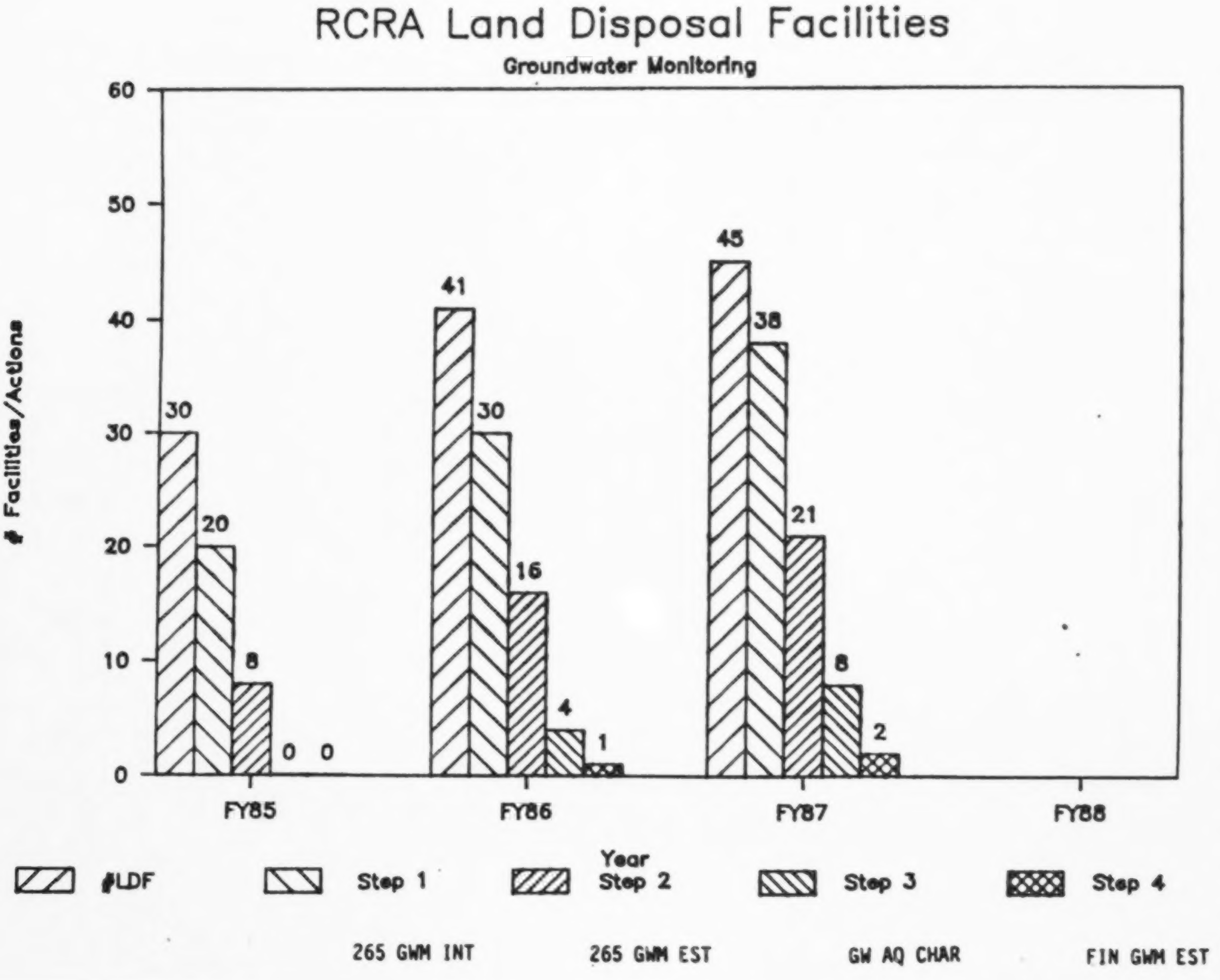
Summary of Data

See graphs on following pages.

RCRA Land Disposal Facilities

Groundwater Contamination





RCRA Land Disposal Facilities

Groundwater Monitoring

New Directions

During FY 87, certain aspects of the indicator were revised to more accurately convey information about regional progress in protecting groundwater quality. For FY 88 and beyond, the indicator may require revision to reflect certain changes in program emphasis. Potential revisions in the future may include:

- The addition or modification of certain parameters to the existing indicator.
- An increase in the universe of RCRA regulated entities to be evaluated (i.e., regulated treatment and storage facilities other than LDFs such as incineration, storage, and treatment facilities since these facilities may also have non-regulated units requiring corrective action during permitting.

Appendix A
RCRA Environmental Indicator Definitions

1. Interim Status Groundwater Monitoring System Initiated

Indicates the facility has initiated the development and installation of a groundwater monitoring system required under 40 CFR Part 265 at the regulated unit(s) to determine the impact on the quality of groundwater beneath the facility.

2. Interim Status Groundwater Monitoring System Established

Indicates the facility has established an interim status groundwater monitoring program required under 40 CFR Part 265 at the regulated unit(s) to determine the impact on the quality of groundwater beneath the facility. An interim status groundwater monitoring program consists of the following components:

a. Development and installation of a monitoring system
b. Background monitoring
c. Routine monitoring and evaluation
d. Conducting assessments
e. Reporting requirements

3. Aquifer Characterized

Indicates EPA/State has determined that the facility has satisfied the requirements under 40 CFR Parts 264 and 270 for the regulated unit(s) regarding protection of groundwater. This includes:

a. A summary of the groundwater monitoring data obtained during the interim status period under 40 CFR part 265.
b. Identification of the hydrogeology beneath the facility, including groundwater flow, direction and rate.
c. A description of any plume of contamination, if any, that has entered the groundwater from the regulated unit.
d. Identification of the concentration or maximum concentration of regulated hazardous constituents in the plume.

4. Final Groundwater Monitoring System Established

Indicates EPA/State has determined that the facility has developed an adequate groundwater monitoring program necessary for conducting detection monitoring and compliance monitoring, or corrective action as required under 40 CFR Part 264 at the regulated unit(s). Aspects of the groundwater monitoring program are specified in the RCRA permit issued to LDFs. An adequate program includes installation of an appropriate monitoring system and demonstration of proper techniques and procedures for sampling and analyzing monitoring results.

Detection monitoring is conducted to determine if hazardous wastes are leaking from the regulated unit. Detection activities are similar to those outlined under interim status. If leakage is detected, the facility must institute compliance monitoring and establish groundwater protection standards. **Compliance monitoring** is conducted to evaluate the concentration of certain hazardous constituents in the groundwater to determine if groundwater contamination is occurring. If compliance monitoring indicates any significant increase in the concentration of certain hazardous constituents, corrective action must be instituted. Corrective action is conducted to bring the facility contaminating groundwater into compliance. This can be achieved by removing hazardous waste constituents from the groundwater or treating the groundwater in place.

5. Remedial Action Measures Initiated

Indicates the facility has initiated remedial action measures to remove or treat in place releases of hazardous constituents to the groundwater from regulated or non-regulated units.

RCRA Environmental Indicators
FY 88 and Beyond

In FY 88 and beyond, the RCRA program will expand its focus of RCRA regulated entities to be evaluated. In addition to tracking groundwater detection and remediation accomplishments at Land Disposal Facilities (LDFs), similar accomplishments at non-LDFs such as incineration, storage, and treatment facilities (TSFs) will be tracked. Specifically, the focus of evaluation at TSFs will be the detection and remediation of both groundwater and soils contamination resulting from improper waste management practices which occurred at such facilities in the past. These improper waste management practices are commonly called Solid Waste Management Units (SWMUs) and are subject to the corrective action requirements under Section 3004(u) of HWSA. The indicator parameters for tracking milestone accomplishments at LDFs and TSFs are depicted in Measures A and B which follow.

The RCRA program met with the Office of Groundwater in the development of these measures to ensure consistency and continuity between programs.

Measure A Groundwater Quality at RCRA Regulated LDFs:

A. Detection (Steps)

The number of RCRA regulated LDFs = Universe

1. The number of LDFs with interim status groundwater monitoring systems initiated pursuant to 40 CFR Part 265
2. The number of LDFs with interim status groundwater monitoring systems established pursuant to 40 CFR Part 265
3. The number of LDFs for which the aquifer is characterized in order to establish an appropriate groundwater monitoring system pursuant to Parts 264 and 270
4. The number of LDFs with final groundwater monitoring systems established pursuant to 40 CFR Parts 264 and 270
5. The number of LDFs with known groundwater contamination due to releases from regulated and/or non-regulated units (SWMUs)

B. Remediation (Steps)

6. The number of LDFs with known groundwater contamination due to releases from regulated and/or non-regulated units (SWMUs) for which remedial actions have been initiated
7. The number of LDFs with remedial actions underway for which groundwater contamination has been stabilized and/or reduced *
8. The number of LDFs with remedial actions completed

* *This indicator parameter which addresses interim progress in remedying groundwater contamination is subject to modification. The feasibility of collecting data for this particular element will be assessed during FY 88.*

Measure B Groundwater Quality/Soils Quality at RCRA Regulated TSFs Other Than LDFs (Incineration, Storage and Treatment Facilities):

A. Detection (Steps)

The number of RCRA regulated TSFs = Universe

1. The number of TSFs with assessments completed to determine existence of potential releases
2. The number of TSFs with releases identified

B. Remediation (Steps)

3. The number of TSFs for which remedial actions have been initiated
4. The number of TSFs for which releases have been characterized in order to implement comprehensive remedial action measures
5. The number of TSFs with remedial actions underway for which groundwater/soil contamination has been stabilized and/or reduced
6. The number of TSFs with remedial actions completed

Note: *This indicator is subject to modification. Certain parameters contained in the indicator may need to be revised over time to more accurately depict regional progress in detecting and remedying contamination at these facilities.*

Superfund Environmental Indicators
FY '87

1. Preliminary Assessments Completed
2. Site Inspections Completed
3. Emergency Removal Actions
4. Orders Issued for Emergency Removals
5. RI/FS Initiated
6. RD/RA Initiated/Completed
7. Orders Issued RI/FS and RD/RA
8. Dollars Recovered from PRPs
9. Estimated Dollar Value of PRP Actions
10. Aquifers Made Usable or other Environmental Improvements due to Superfund Action
11. Alternative Technologies Utilized

Superfund Environmental Indicators
FY 87 Data Summary

1. Preliminary Assessments completed	127
2. Site Inspections completed	61
3. Emergency Removal Actions Fund Financed	5
4. Orders Issued for Emergency Removals	2
N.W. Pipeline, Washington	
Portable Equipment, Oregon	

5. RI/FS initiated	**Financed**
Arrcom, Idaho	Fund
Allied Plating, Oregon	Fund
Mica Landfill, Washington	Fund
Silver Mountain Mine, Washington	Fund
Wyckoff Co./Eagle Harbor, Washington	Fund
Teledyne Wah Chang, Oregon	PRP
Hidden Valley Landfill, Washington	PRP
FMC Corp.	PRP

6. RD/RA Initiated/Completed	
RD Initiated:	
United Chrome, Oregon	Fund
RD Completed:	
United Chrome, Oregon	Fund
Lakewood (Ponders Corner), Washington	Fund
Commencement Bay - So. Tacoma Channel - 12A	Fund
Western Processing, Washington	PRP
RA Initiated:	
Commencement Bay - So. Tacoma Channel - 12A	Fund
United Chrome, Oregon	Fund
Western Processing, Washington	PRP

7. Orders Issued

RI/FS:

- Teledyne Wah Chang, Oregon
- FMC Corp., Washington
- Bunker Hill, Idaho (PRP takeover)
- Hidden Valley, Washington (State Order)

RD/RA Consent Decree:

- Western Processing, Washington

8. Dollars Recovered from PRPs

Dollars preserved for the fund this year were primarily from PRP actions taken rather than actual cost recoveries.

9. Estimated dollar value of PRP Actions	
RI/FS:	
Bunker Hill	$7,000,000
FMC Corp.	500,000
C.Bay - Tar Pits	75,000
Midway Landfill	2,000,000
Pacific Hide and Fur	150,000
Teledyne Wah Chang	2,000,000
RD/RA:	
Western Processing	40,000,000
Removals:	
N.W. Pipeline	100,000
Portable Equipment	300,000
Comm.Bay-ASARCO	2,000,000

10. Aquifers made usable or other environmental improvements due to Superfund action:

Comm. Bay-Well 12A groundwater treatment being initiated

Western Processing groundwater treatment being initiated

11. Alternative Technologies Utilized:

Western Processing in-situ leaching

Chapter 12: Superfund

Discussion

Superfund "Environmental Indicators" for FY 87 are primarily activity indicators. They describe milestones or progress through the Superfund process. While activity indicators are important measures of program performance, they are not true environmental indicators.

The one exception on the current list is item (k), "Aquifers made usable or other environmental improvements due to Superfund action." This item is broad enough to include all environmental improvements resulting from the Superfund program; however, it is questionable whether, by itself, it tells the reader anything.

It is important to keep in mind the nature of the Superfund process and the long time frames involved. Over a thousand sites have been identified as having potential problems in this region. Of those, 38 have been put on the NPL and about a dozen have been handled as emergency removals. Superfund Remedial Investigations and Feasibility Studies typically begin one to two years after a site is listed on the NPL. The result is an understanding of the nature and extent of contamination and a proposal about how to clean it up. That is followed by years of remedial action, if necessary, to deal with the problems found. Removals may be done at either NPL or non-NPL sites to deal with emergencies or health threats, but are often not the end of our response.

If the goal is to truly indicate improvements to the environment, perhaps there is a better way. For NPL sites, once an RI/FS is complete, a site could be entered on a list of "environmental problems" and the contamination described. Then, when remedial design is complete, the design and cleanup targets could go on the list and annual assessments (monitoring results) made of progress. For removals, a preliminary assessment of contamination could be made when we decide to begin a removal, and then assessments of the result could follow the removal action. Simply listing improvements (item k) without some frame of reference is not very useful.

It is also important to remember that Superfund's mandate is to protect public health and the environment. Protection of public health in some cases may be achieved by "simply" installing a fence. We do not know how to measure the benefits of such actions, but we know they are important.

In summary, the current indicators give little true indication of environmental improvement, and to meaningfully show such improvement, there must also be some basis or standard for comparison.

Superfund Environmental Indicators Modifications for FY 88 (& Beyond)

In FY88, our focus will be on groundwater and soils remediation and cleanup of contaminated surface materials. The following new indicators track progress in cleanup of groundwater, soils, and surface materials. Groundwater remediation primarily occurs at NPL sites, while soils and surface materials cleanup routinely occurs at both NPL and non-NPL removal sites. We have met with the Office of Groundwater to discuss the groundwater environmental indicator to assure consistency and continuity between the Groundwater and Superfund programs. We will also continue to track milestone accomplishments as depicted by the visual, "Region 10 Superfund Program Accomplishments".

New Superfund Environmental Indicators

Groundwater Cleanup
(NPL Sites)

1. Number of sites with groundwater contamination
2. Number of sites under investigation
3. Number of sites with remediation in design or construction phase
4. Number of sites with ongoing O&M

Soils
(NPL and Non-NPL Removal Sites)

1. Number of sites with contaminated soil
2. Number of sites under investigation
3. Number of sites with remediation in design or construction phase
4. Number of sites with remediation ongoing
5. Number of sites with remediation complete

Surface Materials
(NPL and Non-NPL Removal Sites)

1. Number of sites where surface accumulation of materials represents public health or environmental exposure problem
2. Number of sites where remediation stabilized or eliminated threats of exposure to the public or to the environment